



**PLEASE CHECK FOR CHANGE INFORMATION
AT THE REAR OF THIS MANUAL.**

143

SECAM TEST SIGNAL GENERATOR

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
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Product Group 20

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WARNING

THE REMAINING PORTION OF THIS TABLE OF CONTENTS LISTS THE SERVICING AND INSTALLATION INSTRUCTIONS. THESE INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY.

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CHANGE INFORMATION

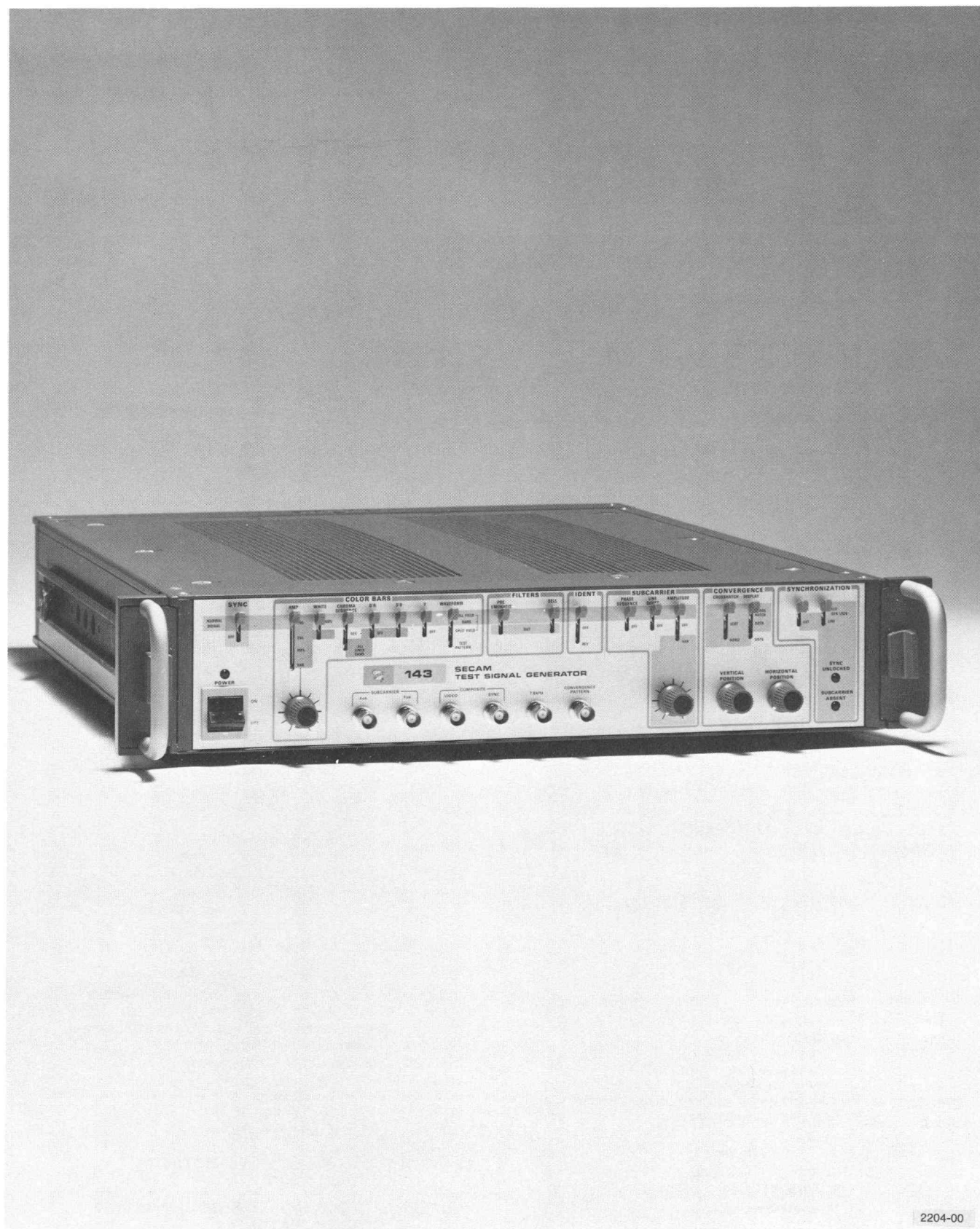


Fig. 1-1. 143 SECAM Test Signal Generator.

PART 1

OPERATING INFORMATION

This instruction manual is divided into two main parts. PART 1, OPERATING INFORMATION, is designed to be used by anyone who needs to know how to operate the 143 SECAM Test Signal Generator. All procedures and instructions in PART 1 can be carried out without exposing the operator to any identifiable hazard.

PART 2 of this instruction manual contains the SERVICE INFORMATION and is intended for use by personnel familiar with electronic circuit operation. Such personnel are identified here as "Qualified Technicians". Procedures and instructions in PART 2 should be carried out by qualified technicians only; PART 2 exposes personnel to hazardous voltages.

An obvious divider page is inserted between PART 1 and PART 2.

Section 1

INSTALLATION

This section contains an explanation of safety warnings, list of accessories, instructions for installation (either cabinet models or rackmounts, where the 143 is a direct fit), and repackaging instructions.

SAFETY SUMMARY

The safety information contained here applies to both operators and service technicians. Throughout this manual two basic safety headings will be noted. They are:

WARNING. This is information intended to protect personnel from hazards.

CAUTION. This is information intended to protect the instrument from damage.

The following are general safety precautions that should be observed under all conditions.

WARNING

Electrical shock hazards are present inside this instrument and only qualified personnel should remove the protective covers.

WARNING

Instrument chassis must be properly grounded in order to reduce electrical shock hazard. Refer to following paragraph for more information.

POWER MAINS

The 143 SECAM Test Signal Generator operates from a single-phase power source with one of the current-carrying conductors at ground (earth) potential. Only the line or ungrounded conductor has over-current (fuse protection; operation where both current-carrying conductors are live with respect to ground, such as phase-to-phase on a 3-wire system, is **not recommended**.

This instrument is supplied with a 3-wire, 3-terminal polarized power cord. The earth ground terminal of the power cord is connected to the metal parts of the instrument. For electrical shock protection, insert the power plug in a mating outlet with an earth ground contact.

Table 1-1 gives the color codes of power cord conductors used with Tektronix instruments.

Table 1-1

POWER CORD CONDUCTOR COLOR IDENTIFICATION

| Conductor | Color | Alternate Color |
|--------------------|--------------|-----------------|
| Ungrounded (Line) | Brown | Black |
| Grounded (Neutral) | Blue | White |
| Grounding (Earth) | Green-Yellow | Green-Yellow |

Power Cord Adapters

If a 3-to-2-wire adapter is used to connect the instrument to a 2-wire power outlet, be sure that the adapter is equipped with an external ground lead. Be sure to connect the external ground lead to earth ground. Failure to complete the grounding system may allow the metal parts of this instrument to be elevated above earth ground potential and create an electrical shock hazard.

WARNING

Do not operate this instrument without adequately grounding the earth ground terminal of the power cord.

PHYSICAL INSPECTION

After carefully removing the 143 SECAM Test Signal Generator from the shipping carton, inspect the instrument for any possible damage incurred during shipment. Report any damage or shortage to the carrier as soon as possible.

Save the shipping carton in case it is needed to repackage the instrument for subsequent shipment.

ACCESSORIES

All 143 SECAM Test Signal Generators are shipped with a power cord and instruction manual. In addition, rackmount models are shipped with a set of rack slides; see the Replaceable Mechanical Parts list for their Tektronix part number.

Optional Accessories

Tektronix has available a large number of accessory items. For more information, consult either the general catalog or the television products catalog, or contact a Tektronix Field Office or sales representative.

INSTALLATION

The 143 SECAM Test Signal Generator, in the rackmount version, is designed to fit a 19-inch rack. Both cabinet model and rackmount have a 3 1/2-inch high front panel. The following paragraphs outline the steps required to place the 143 into operation, provided that no major rackmounting procedures are required.

Cabinet Models

Check that the mains voltage, as indicated by the rear-panel index marker, matches the mains supply that the 143 is to operate from. Be sure that adequate space is provided for free circulation of cooling air around the cabinet.

Rackmounts

Check that the mains voltage, as indicated by the rear-panel index marker, matches the mains supply that the 143 is to operate from. The rackmount version of the 143 is designed to fit into a 3 1/2-inch slot in a 19-inch rack. Mounting tracks are centered in the opening. Detailed rackmounting instructions are located in PART 2 of this manual.

FAMILIARIZATION

To familiarize the user with operation of the 143 SECAM Test Signal Generator, the following brief checkout procedure is provided. It is simple and straight forward, requiring only a picture monitor and waveform monitor to complete. It will involve only the COMPOSITE VIDEO, CONVERGENCE, and SYNC outputs.

Equipment Required

1. Color Picture Monitor. A broadcast quality picture monitor, such as the TEKTRONIX 653A.
2. Waveform Monitor. A waveform monitor capable of displaying one specific line out of four fields, numerous time bases (1 or 2 lines, 2 fields and magnification up to X50) and both internal and external sync capabilities. For example, a Tektronix 1480-Series Option 8 Waveform Monitor.

Initial Hook-up

Use 6 coaxial cables and 2 75 Ω terminations to connect the equipment as shown in Fig. 1-2.

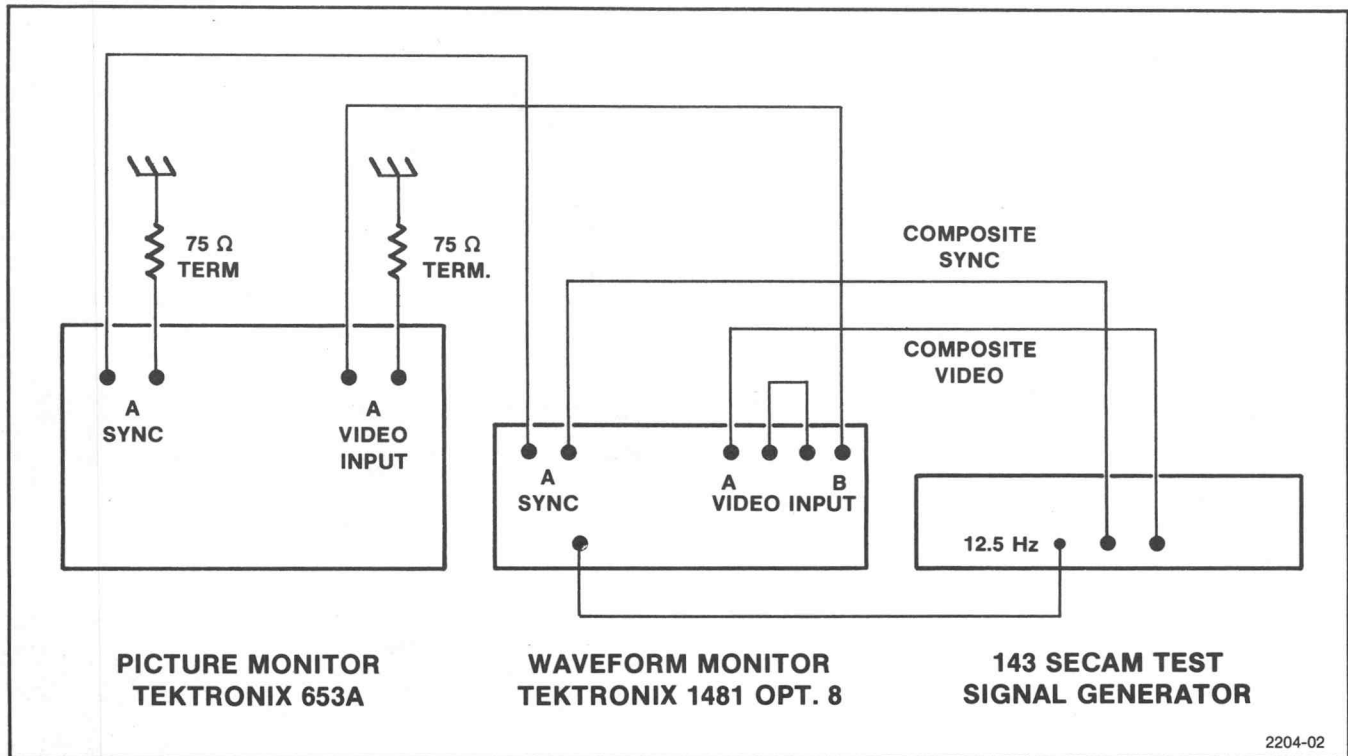


Fig. 1-2. Familiarization Procedure Connections.

Preset

Set all 143 front-panel switches to their up (or normal) position.

Set the waveform monitor for a unmagnified, internally synchronized, 2 Field display. Use AFC Sync and turn off the DC Restorer.

Set up the picture monitor for a full field display.

Checkout Procedure

1. SYNC: Set the 143 SYNC switch to the OFF position and note that both line and field sync are gone. Return SYNC switch to the NORMAL SIGNAL position.

COLOR BARS

2. AMPLitude: Set the waveform monitor for a two-line Display ($10 \mu\text{s}/\text{DIV}$ on a 1480-Series Waveform Monitor), and check that the LINE SELECTOR is OFF.

Switch the AMP switch to 25% and note the amplitude of the color bars (on waveform monitor), excluding white. See Fig. 1-3.

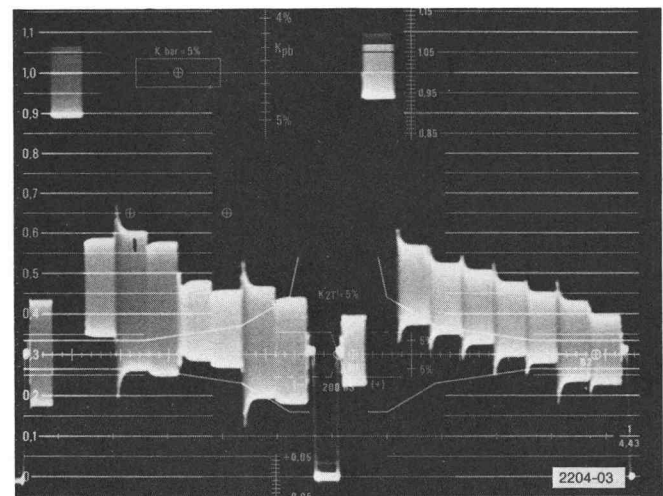


Fig. 1-3. 25% Color Bar signal.

Installation—143 SECAM

Set the AMP switch to 100% and observe the color bar amplitudes, see Fig. 1-4.

Change the AMP switch to VAR and rotate the VAR control back and forth. Set the control fully counterclockwise and check that all color bars, except white, are at black level. See Fig. 1-5. Rotate the VAR control fully clockwise and check for color bar amplitudes greater than those observed at 75%, see Fig. 1-6.

Leave the AMP switch in VAR.

3. WHITE: Check the waveform monitor for a full amplitude pedestal for white (100%), see Fig. 1-7.

Change the WHITE switch to the position tied to the AMP switch and rotate the VAR AMP control counterclockwise. Check for a full line at black level, see Fig. 1-8.

Set both AMP and WHITE switches in the up or NORMAL SIGNAL position.

4. CHROMA SEQUENCE: Set the waveform monitor for a 2-line display (10 μ s/DIV), see Fig. 1-9.

Note that one displayed line is D'R and D'B.

Change the CHROMA SEQUENCE switch to REV and note that the D'R and D'B lines reverse positions, see Fig. 1-10.

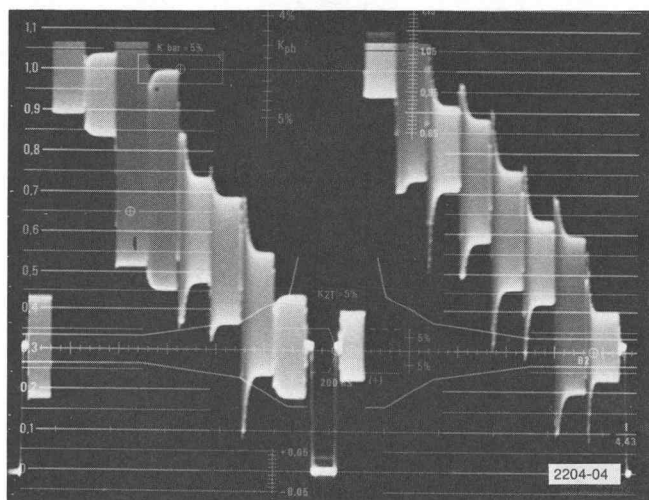


Fig. 1-4. 100% Color Bar.

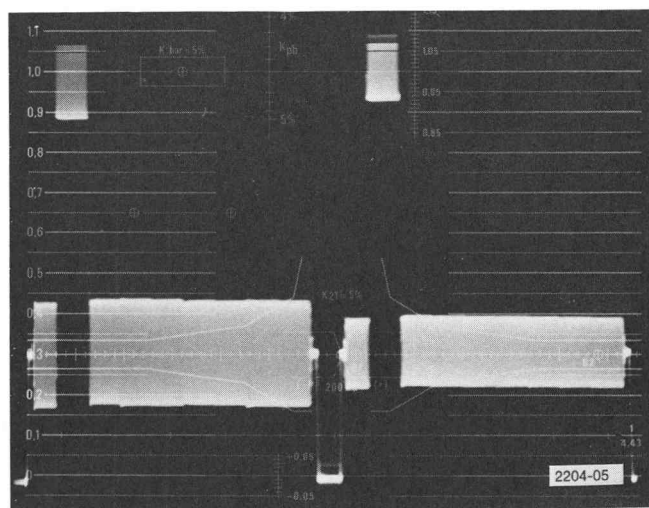


Fig. 1-5. Variable Amplitude counterclockwise.

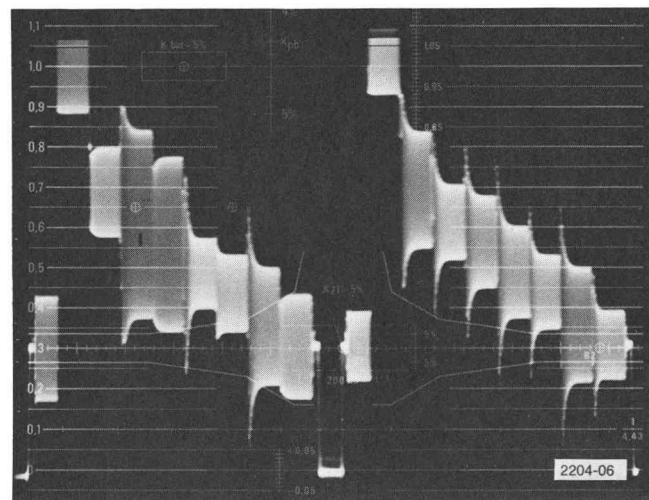


Fig. 1-6. Variable Amplitude full clockwise.

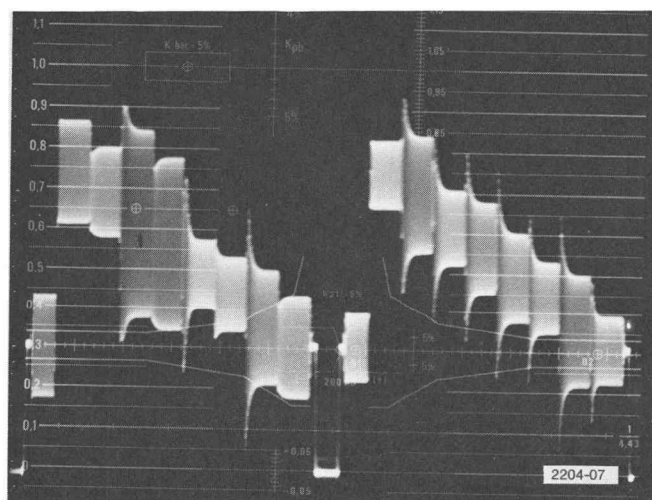


Fig. 1-7. 100% white with Variable Amplitude.

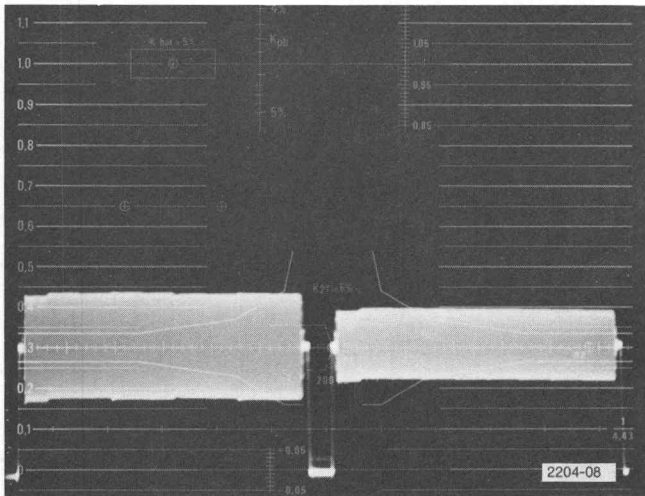


Fig. 1-8. White Bar Amplitude at 0 with Variable Amplitude.

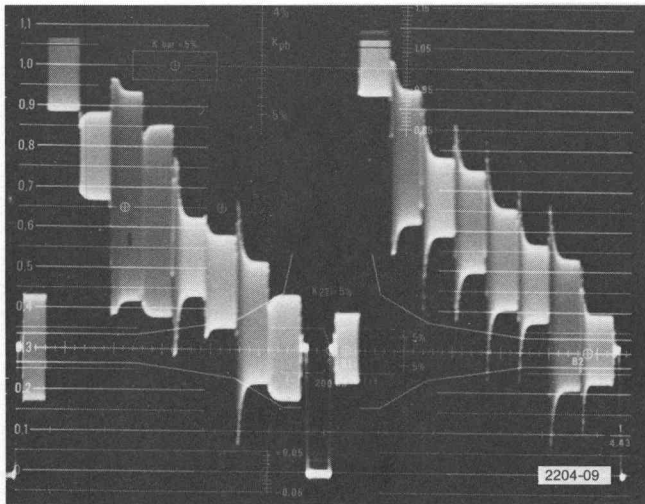


Fig. 1-9. Color Bar display 2 lines.

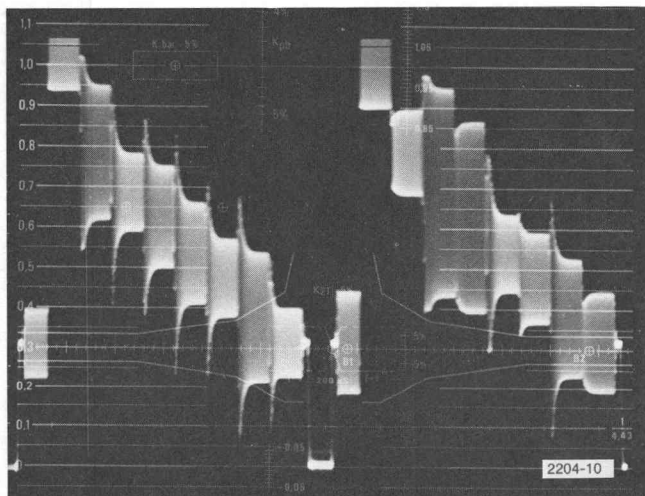


Fig. 1-10. D'R and D'B lines reversed sequence from Fig. 1-9.

Change CHROMA SEQUENCE switch to ALL LINES SAME and observe that the line sequence returns to the original order.

Set the D'R switch to OFF and note that both lines are D'B. See Fig. 1-11.

Turn ON D'R switch and turn OFF D'B switch. Now all lines are D'R, see Fig. 1-12.

Set all switches to the NORMAL SIGNAL position.

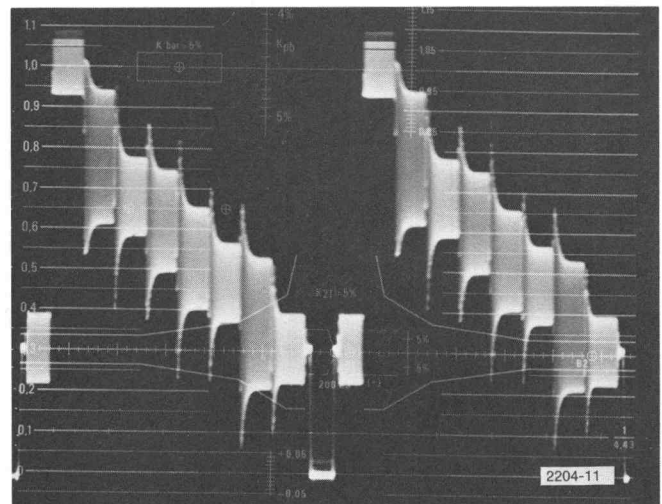


Fig. 1-11. 2 lines of D'B.

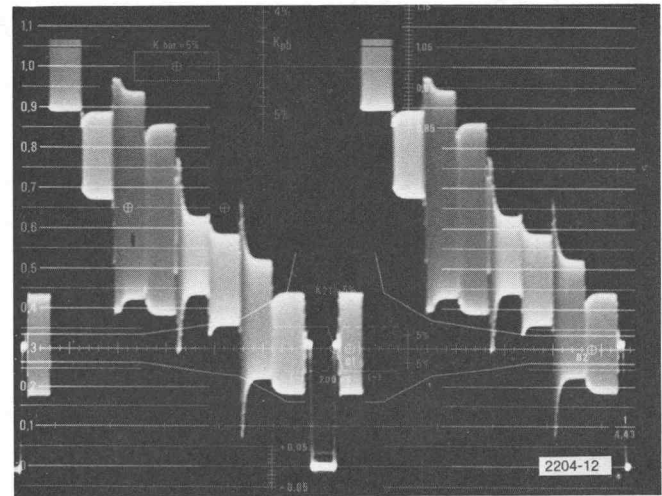


Fig. 1-12. 2 lines of D'R signal.

Installation—143 SECAM

5. D'R: Set the D'R switch to OFF and observe that the D'R line now has constant amplitude subcarrier for the duration of the line. See Fig. 1-13.

Set D'R switch to the NORMAL SIGNAL position.

6. D'B: Set the D'B switch to OFF and observe that the D'B line now has constant amplitude subcarrier for the duration of the line. See Fig. 1-14.

Set D'B switch to the NORMAL SIGNAL position.

7. Y: Set the Y switch to OFF and note that both lines are now displayed without luminance, see Fig. 1-15.

Set the Y Switch to the NORMAL SIGNAL position.

8. WAVEFORM: Turn off the waveform monitor's line selector. Set the 143 WAVEFORM switch to SPLIT FIELD and observe a waveform monitor display similar to Fig. 1-16.

Set the WAVEFORM switch to TEST PATTERN and observe a display similar to Fig. 1-17.

Set the WAVEFORM switch to FULL FIELD BARS (NORMAL SIGNAL).

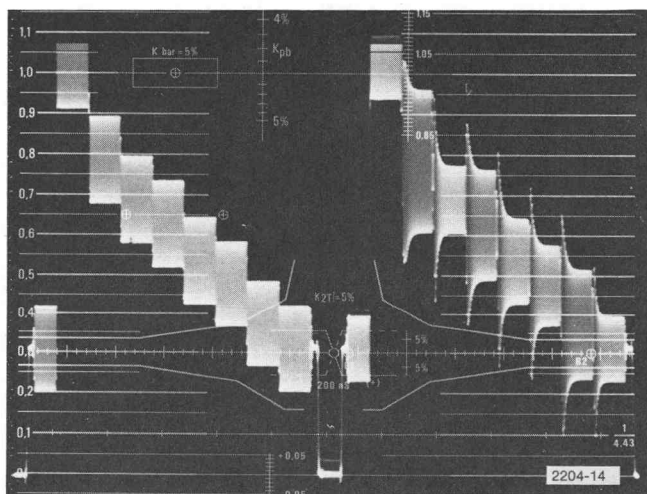


Fig. 1-13. D'B line normal, D'R line constant amplitude subcarrier.

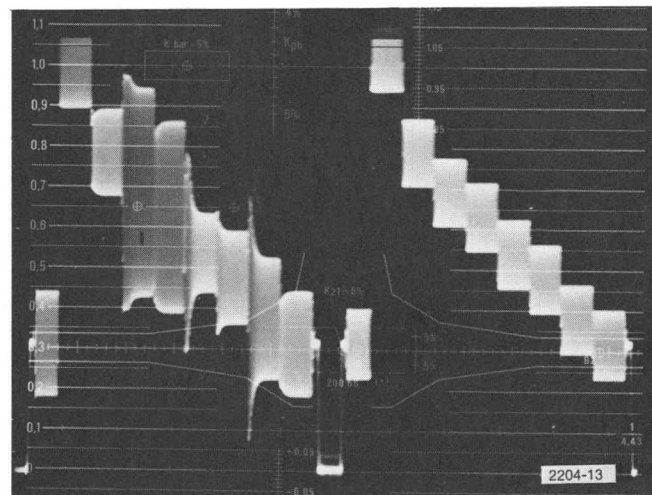


Fig. 1-14. D'R line normal D'B line constant amplitude subcarrier.

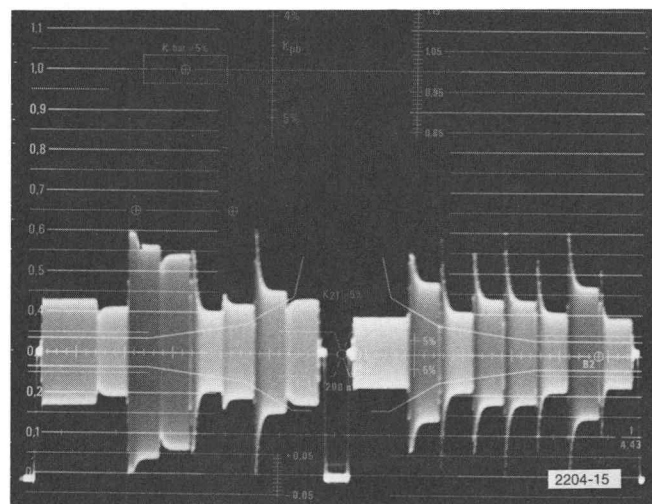


Fig. 1-15. No Luminance on Color Bar signal.

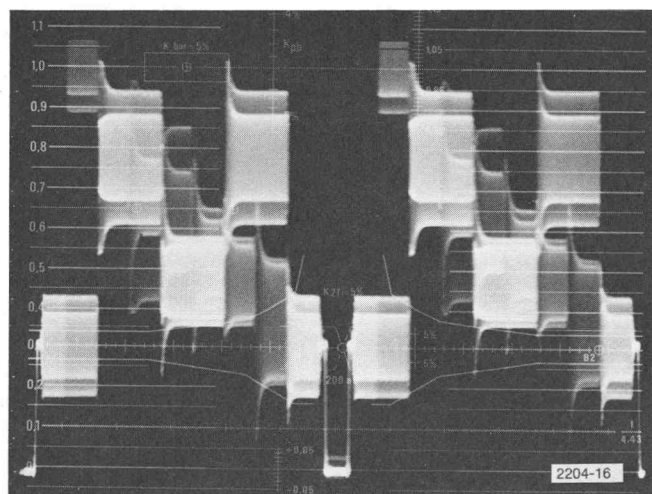


Fig. 1-16. Split field observed on Waveform Monitor (15 line display on Waveform Monitor used to eliminate unwanted signal).

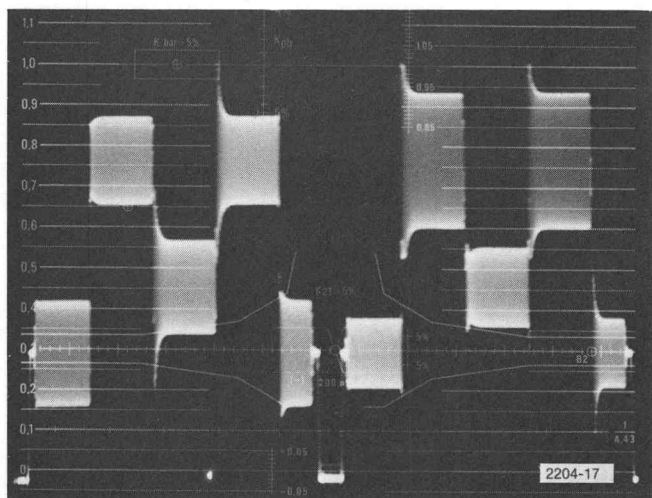


Fig. 1-17. Test Pattern, Black-Yellow-Red-Yellow-Black, as full field display.

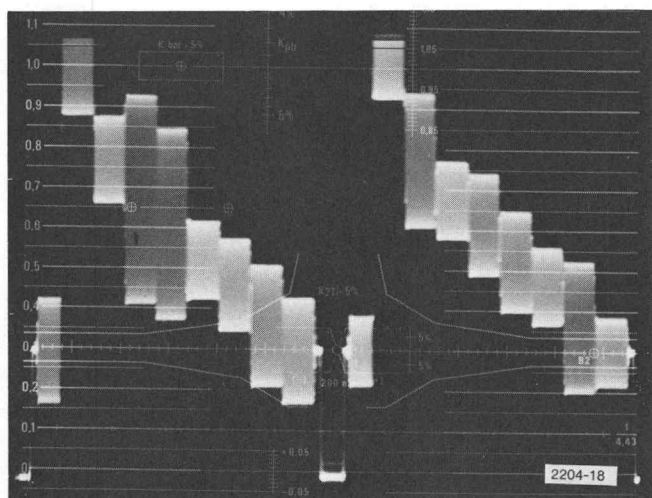


Fig. 1-18. 2 lines of Color Bar signal with Pre-Emphasis off.

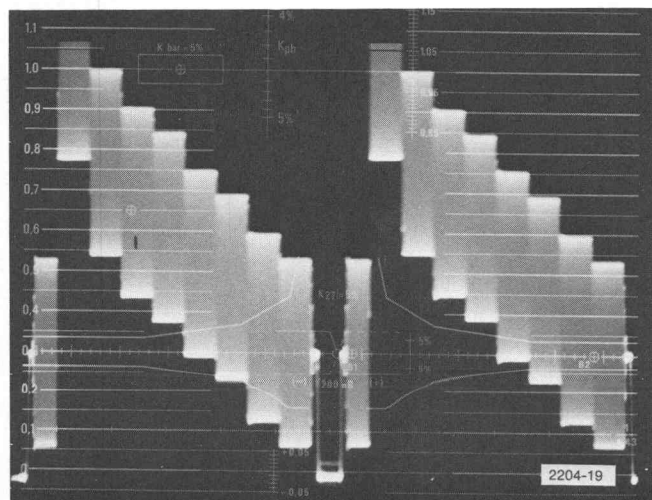


Fig. 1-19. 2 lines of Color Bar signal with Bell filter switched out.

FILTERS

9. PRE EMPHASIS: Set the PRE EMPHASIS switch to OUT and observe that the color bars are flat with no overshoot or rolloff. See Fig. 1-18.

Return PRE EMPHASIS switch to NORMAL SIGNAL position.

10. BELL: Set the BELL switch to OUT and observe that the Waveform Monitor display now shows constant amplitude subcarrier for both lines. See Fig. 1-19.

Set the BELL switch to the NORMAL SIGNAL position.

IDENT

11. IDENT: Set the waveform monitor to display lines 12 and 13 from field one. Note that line 12 has a D'B identification signal (bottle) and line 13 a D'R. See Fig. 1-20.

Change the 143 IDENT switch to OFF and observe that no identification signals are present.

Set the IDENT switch to REV and observe that line 12 now has the D'R identification signal and line 13 the D'B signal.

Return the IDENT switch to the NORMAL SIGNAL position.

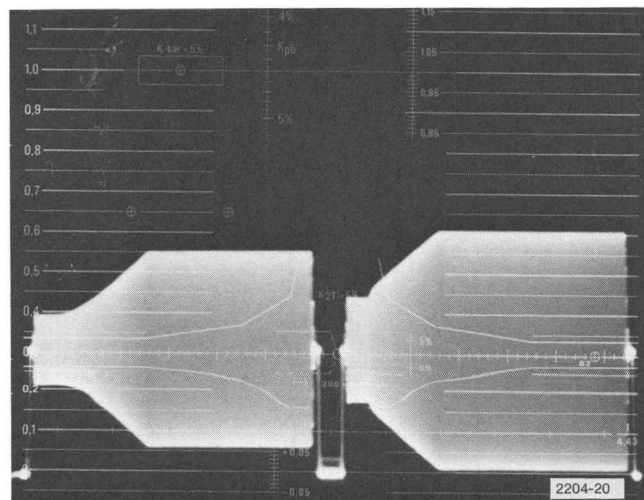


Fig. 1-20. 2 lines of Field Identification signal.

SUBCARRIER

12. PHASE SEQUENCE: Set the waveform monitor for a regular 2-line display (Line Selector Off), and the Mag. to X20. Switch the 143 PHASE SEQUENCE switch up and down several times and note that each color bar becomes a single-phase sinewave.

Leave the PHASE SEQUENCE switch in the NORMAL SIGNAL position.

13. LINE BURST: Note from Fig. 1-21 that the start up of the subcarrier occurs directly following line sync time.

Set the LINE BURST switch to OFF and note that subcarrier now starts after blanking (Fig. 1-22).

Return the LINE BURST switch to the NORMAL SIGNAL position.

14. AMPLITUDE: Set the 143 AMPLITUDE switch to OFF and observe that subcarrier is deleted, while the luminance steps remain. See Fig. 1-23.

Set the AMPLITUDE switch to VAR and rotate the associated control fully counterclockwise. Note that the subcarrier is deleted. See Fig. 1-23.

Rotate the AMPLITUDE variable control fully clockwise and observe that the subcarrier amplitude is now approximately double the normal amplitude. See Fig. 1-24.

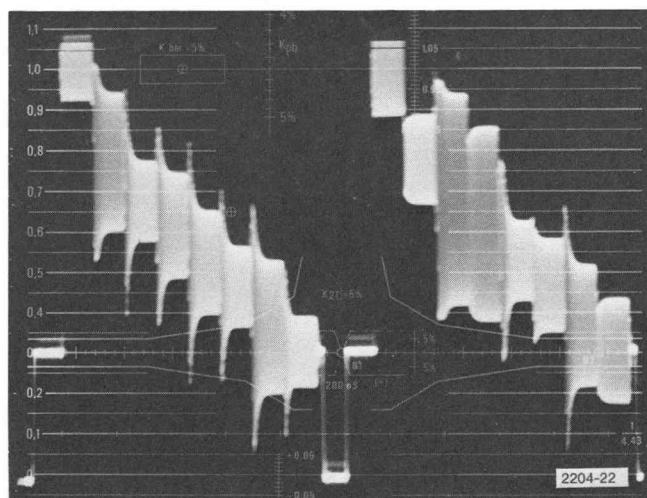


Fig. 1-22. Color Bar signal with no line burst.

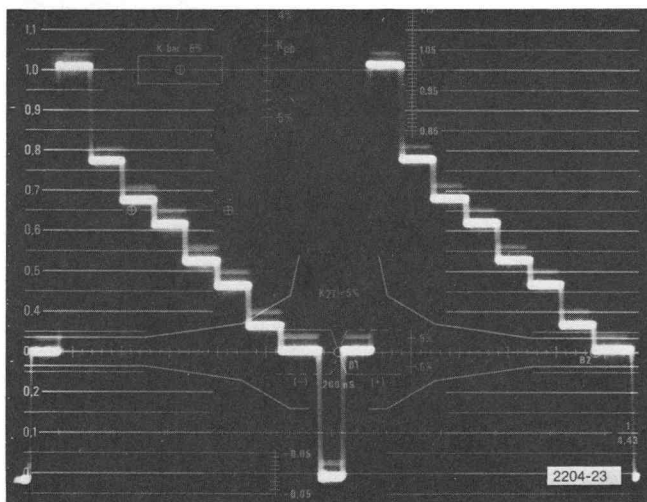


Fig. 1-23. 2 line display with Subcarrier off, luminance only.

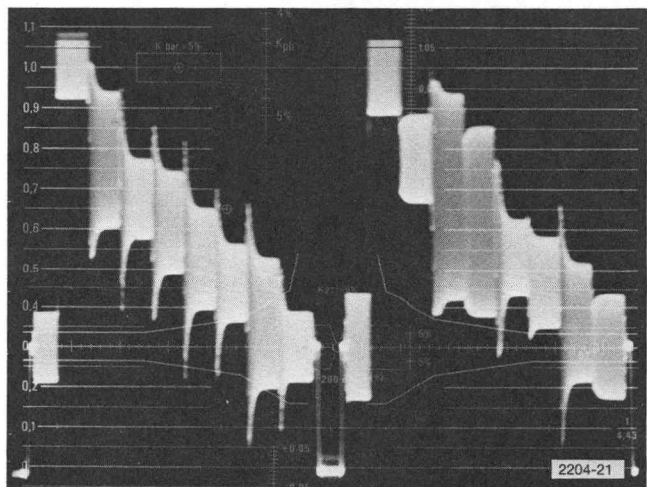


Fig. 1-21. Color Bar signal, 2 lines.

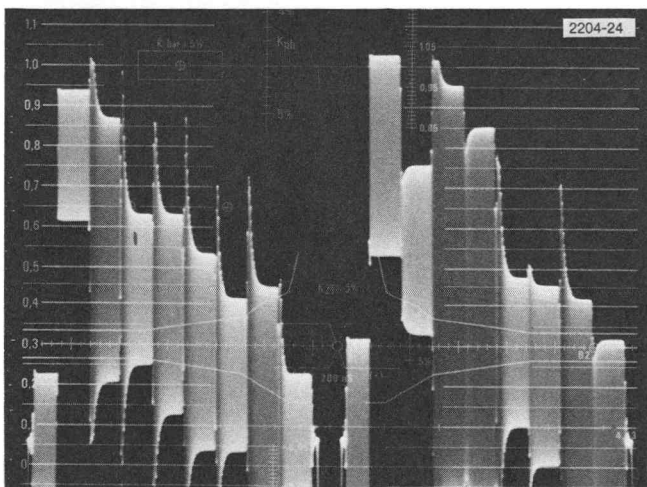


Fig. 1-24. 2 line Color Bar signal with increased subcarrier.

Return the AMPLITUDE switch to the NORMAL SIGNAL position.

CONVERGENCE

Change the 143 output cable to the CONVERGENCE OUTPUT connector.

15. CROSSHATCH: With the CROSSHATCH switch in the ON position, observe the picture monitor. It will be displaying a crosshatch pattern like the one shown in Fig. 1-25.

Set the CROSSHATCH switch to VERT and note that only vertical lines are displayed on the picture monitor.

Set the CROSSHATCH switch to HORIZ and observe that the vertical lines have been replaced by horizontal lines.

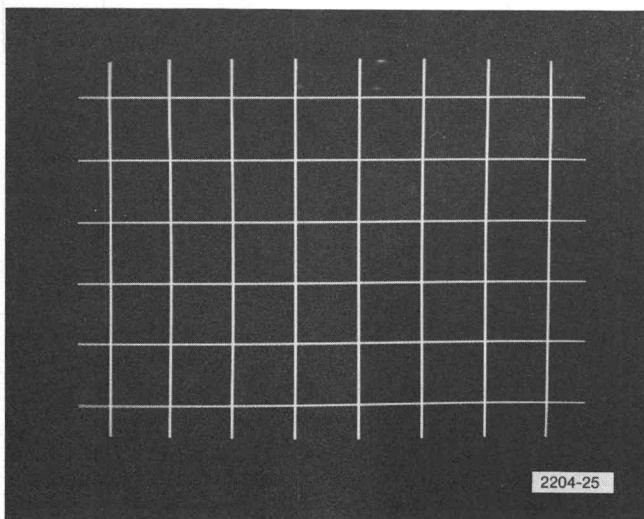


Fig. 1-25. Large Square Convergence pattern on Picture Monitor.

Return the CROSSHATCH switch to the ON position.

16. DISPLAY: Set the DISPLAY switch to BOTH and note that a dot appears in the center of each crosshatch box.

Set the DISPLAY switch to DOTS and note that only the dots remain on the picture monitor.

Return the DISPLAY switch to the CROSSHATCH position.

17. VERTICAL POSITION: Rotate the VERTICAL POSITION control and observe that the picture monitor crosshatch display moves up and down by approximately one vertical division.

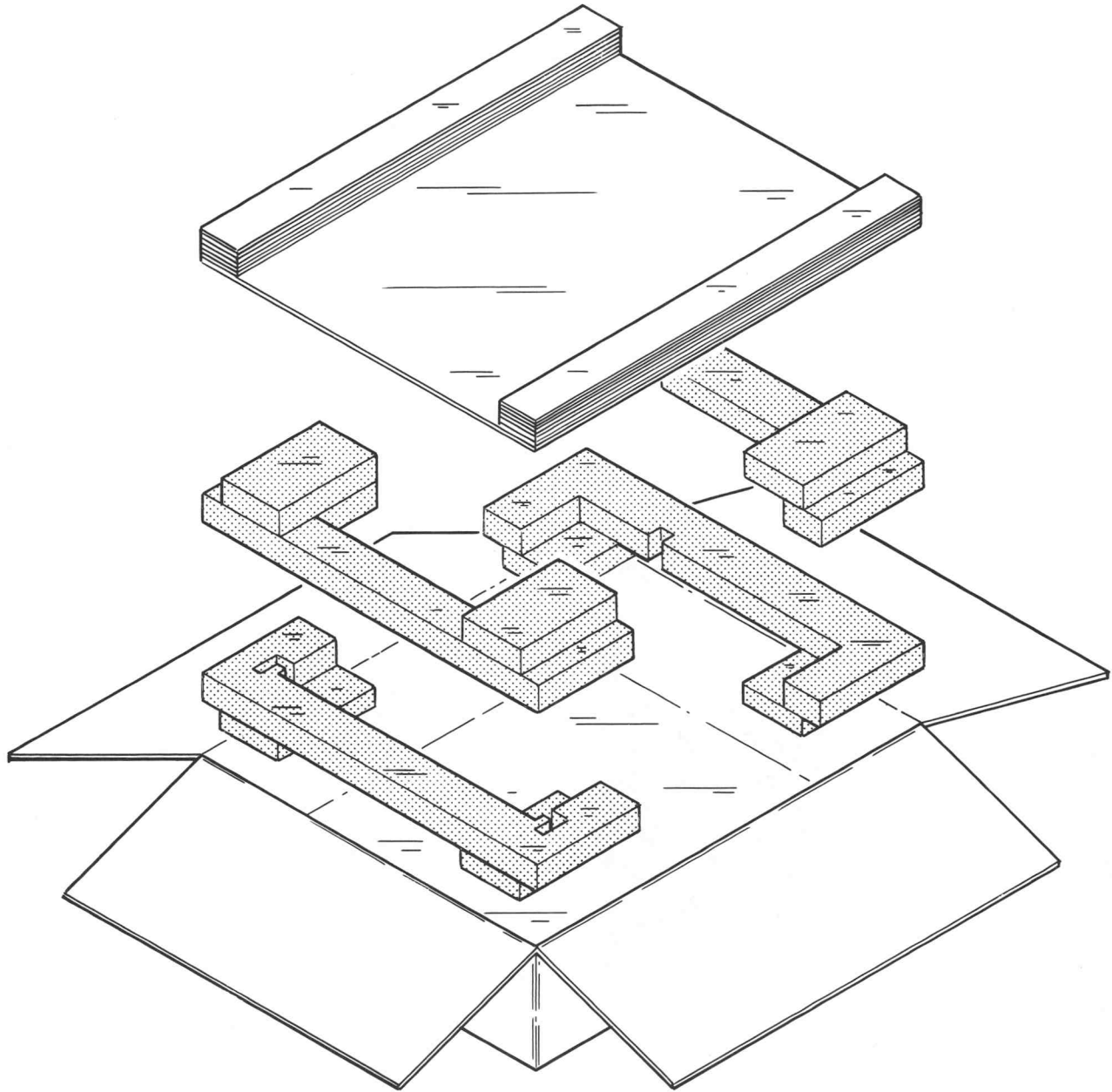
18. HORIZONTAL POSITION: Rotate the HORIZONTAL POSITION control and observe that the picture monitor crosshatch display moves left and right by approximately one horizontal division.

SYNCHRONIZATION

These two switches are used with the 143 SECAM Test Signal Generator's circuits that "gen-lock" the output signal to an incoming video signal. The complete test of this operating mode is found in Section 6 of this manual.

REPACKAGING

Should re-shipment of the 143 be contemplated, the original shipping carton will provide maximum protection. In this carton the 143 has qualified under National Safe Transit Committee Procedure 1A, Category 1. Fig. 1-26 shows how to repackage a 143 for shipment.



2204-26

Fig. 1-26. Original Packaging Materials for the 143.

Section 2

OPERATION

The 143 SECAM Test Signal Generator is a versatile source of the full range of test signals required to check and maintain decoders, picture monitors, and encoders. It provides the accurate color bar signal, either fully encoded or in RGB form, required to check and maintain studio equipment. The accurate color bar signal, plus four test patterns, selectable by internal jumper change, combine to provide unique versatility, previously unobtainable in a single test signal generator.

To provide even greater versatility, the 143 is equipped with a separate 625 line, 50 Hz convergence signal output. Equally accurate 7 X 9 or 14 X 17 line crosshatch patterns may be selected by repositioning an internal jumper. Front-panel switching allows selection of vertical lines, horizontal lines, crosshatch, dots, or a combination of lines and dots. Position controls, located on the front panel, have sufficient range to freely move the crosshatch pattern around the face of a picture monitor crt.

Additional outputs provide useful auxiliary signals. Included are line and field drive, line and field blanking, composite sync, and two specialized signals. These two are a 12.5 Hz squarewave, for identification of the SECAM four-field sequence, and a 7.8 kHz squarewave, for synchronizing a waveform monitor to view either D'R or D'B lines while the 143 is generating a complete test signal. As a special convenience, the two unmodulated carrier (rest) frequencies have been brought out to the front panel to make it easy to verify 143 calibration whenever routine maintenance or recalibration is performed.

The 143 chrominance sequence can be reversed or made all D'B or D'R to check the synchronizing circuits or encoders or decoders.

The Bell filter can be switched out to provide a flat response, within 0.5 dB, from 3.90 to 4.75 MHz. The variable subcarrier amplitude that has been incorporated in the 143 makes it easy to check the effectiveness of decoder limiters under simulated operating conditions.

Consistent with modern test signal generators, the 143 is equipped with generator lock-up (gen-lock) to permit operation that is synchronous with and color referenced to an incoming composite signal. Loss of gen-lock is indicated by front-panel lamps, Sync Unlocked and Subcarrier Absent.

The 143 may be rackmounted, requiring 3 1/2 inches of vertical space in a standard 19-inch rack, or used in its nearly identically-dimensioned cabinet version.

CONTROLS AND CONNECTORS

The following list of the controls and connectors provides the user with a brief description of the function of each of the controls and the signals available from the connectors. The list is referenced to illustrations that accompany them. Each control or connector is accompanied by a number that locates its position on the companion illustration.

Front-Panel Controls

The items listed here can be found on Fig. 2-1.

1. **POWER**—Turns on or off the mains power to the 143. The indicator lights when the POWER switch is on and mains voltage is present.

Normal operation of the 143 for color bar presentation is assured when all switches in the SYNC, COLOR BARS, FILTERS, IDENT, and SUBCARRIER blocks are in the up position.

2. **SYNC**—Provides a choice of: NORMAL, synchronizing pulses included in the composite video signal; or OFF, no synchronizing pulses with the composite video signal.

COLOR BARS

3. **AMP**—(Amplitude) Selects 75% (normal), 100%, or 25% amplitude color bars; VAR (Variable) has a range of approximately 0 to 50%.
4. **WHITE**—A two position switch that selects either 100% white bar amplitude, or allows the white bar amplitude to be selected by the COLOR BARS, AMP switch.

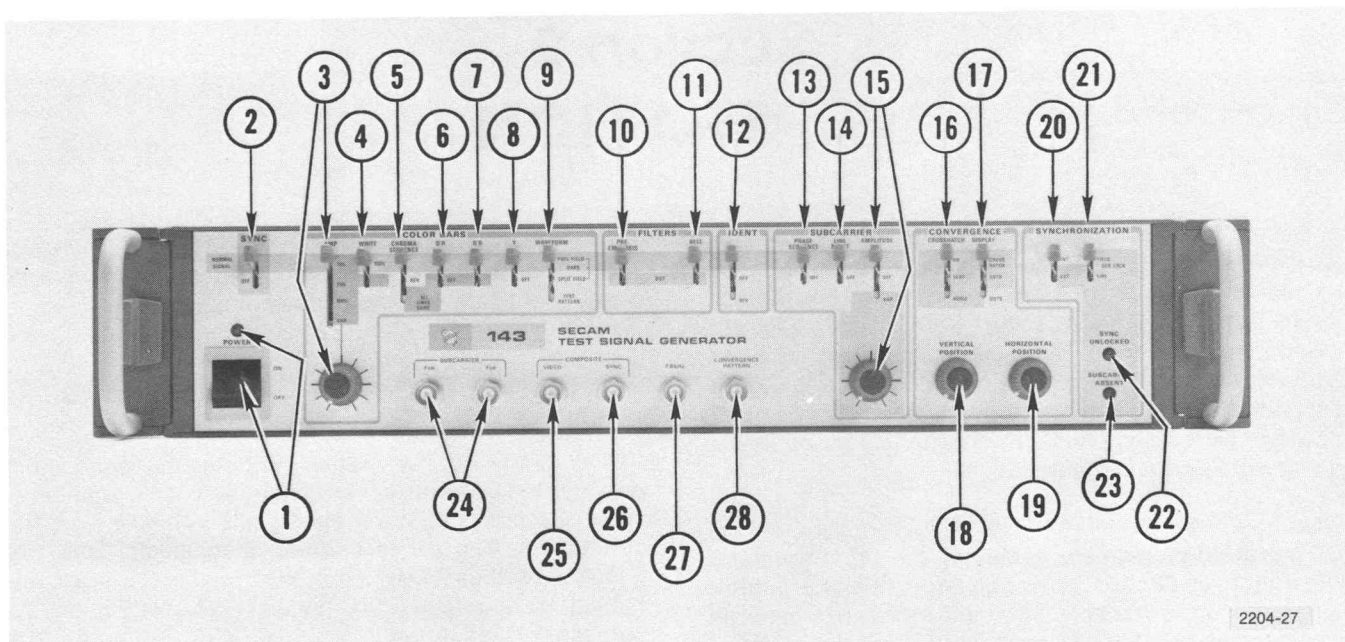


Fig. 2-1. 143 Front Panel controls and connectors.

5. CHROMA SEQUENCE—The normal position, up, has the D'R and D'B subcarrier elements of the composite video signal in the correct sequence. REV, reverses the sequence. ALL LINES SAME permits the displaying of either D'R or D'B lines if one is deleted by the D'R or D'B switches.

6. D'R—OFF deletes the D'R modulation from the subcarrier during D'R lines. If the CHROMA SEQUENCE switch is in the ALL LINES SAME position and the D'B switch is in the normal position, all lines will be D'B.

7. D'B—OFF deletes the D'B modulation from the subcarrier during D'B lines. If the CHROMA SEQUENCE switch is in the ALL LINES SAME position and the D'R switch is in the normal position all lines will be D'R.

8. Y—OFF removes the luminance component from the composite video signal.

9. WAVEFORM—FULL FIELD selects a full field color bar signal.

SPLIT FIELD selects color bars for the upper part of the display and an internal jumper selected signal for the lower part.

TEST PATTERN provides a full field display of the signal that occupies the lower portion of the split field display.

10. PRE-EMPHASIS—OUT removes pre-emphasis from the chrominance signal.

11. BELL—OUT removes the Bell filter from the chrominance channel.

12. IDENT—OFF deletes all subcarrier from lines that normally have field identification signals.

REV reverses the identification pulses with respect to the D'R-D'B sequence occurring during active picture lines.

13. PHASE SEQUENCE—OFF suppresses the subcarrier phase change that normally occurs every third line and every field.

14. LINE BURST—OFF causes the start-up of the subcarrier to be delayed until the end of blanking.

15. AMPLITUDE—OFF deletes the subcarrier from the composite video signal.

VAR allows subcarrier amplitude to be varied over a +6 to -54 dB range. The potentiometer is located directly below the AMPLITUDE switch.

16. CROSSHATCH—ON displays whatever is selected by the DISPLAY switch.

VERT displays vertical lines only.

HORIZ displays horizontal lines only.

17. DISPLAY—CROSSHATCH displays horizontal or vertical lines or a crosshatch pattern, as dictated by the setting of the CROSSHATCH switch.

BOTH adds dots to the previously selected pattern.

DOTS displays only a pattern of dots.

18. VERTICAL POSITION—Moves the convergence pattern up and down.

19. HORIZONTAL POSITION—Moves the convergence pattern left and right.

20. SYNCHRONIZATION INT—Timing determined by the internal crystal-controlled oscillator.

EXT—Synchronizes to the external source, gen-lock.

21. SYNCHRONIZATION GEN LOCK—FIELD: Color sequence synchronizes to information extracted from field identification signals.

LINE: Color sequence synchronizes to information extracted from the line bursts.

22. SYNC UNLOCKED—Lights when the 143 is not synchronous with the external sync source (gen-locked).

23. SUBCARRIER ABSENT—Lights when the incoming subcarrier is lost when operating in the gen-lock mode.

Front-Panel Connectors

The items listed here can be found on Fig. 2-1.

24. SUBCARRIER—FoR provides an output signal at the D'R rest frequency, 4.40625 MHz, for use with a counter in determining subcarrier accuracy. FoB provides an output signal at the D'B rest frequency, 4.25000 MHz, for use with a counter in determining subcarrier accuracy.

25. COMPOSITE VIDEO—Provides the selected video output signal, complete with composite sync.

26. COMPOSITE SYNC—Provides both line and field sync in the correct relationship.

27. 7.8 kHz—Provides a square wave whose repetition rate is equal to 1/2 the line rate.

28. CONVERGENCE PATTERN—The output of the convergence generator, complete with composite sync.

Rear-Panel Connectors

The items listed here can be found on Fig. 2-2.

29. LOOP THRU INPUTS—COMPOSITE VIDEO is used for the gen-lock reference input.

SPARE is not used at this time.

30. CONVERGENCE—Provides the output of the convergence generator, complete with composite sync.

31. RED—The non-encoded red output signal.

32. GREEN—The non-encoded green output signal. This output contains sync, unless internally deleted.

33. BLUE—The non-encoded blue output signal.

34. FIELD DRIVE—Provides a pulse output at the field rate.

35. LINE DRIVE—Provides a pulse output at the line rate.

36. 12.5 Hz (FIELD BLANKING)—A 12.5 Hz square wave output. An internal jumper change can be made to substitute the field blanking waveform (12.5 Hz square wave is needed with the 1480-Series Option 8.)

37. 7.8 kHz (LINE BLANKING)—A 7.8 kHz square wave output. An internal jumper change can be made to substitute the line blanking waveform.

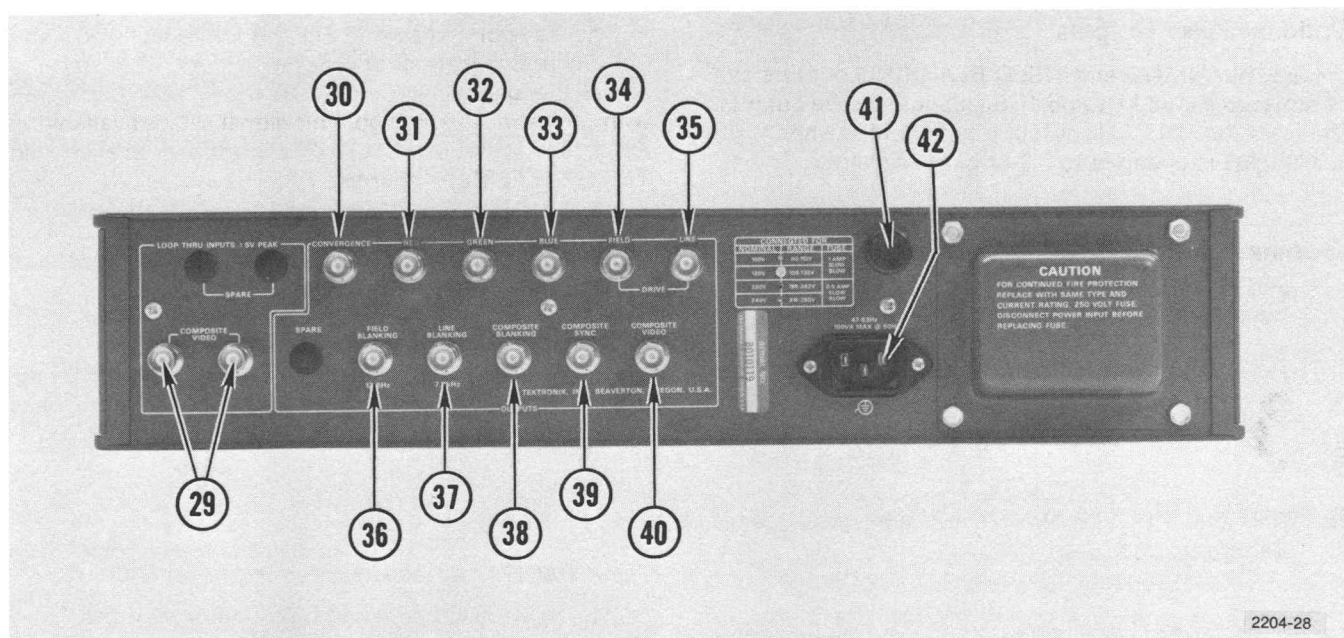


Fig. 2-2. 143 Rear Panel connectors.

- 38. COMPOSITE BLANKING—The combination of the line and field blanking, without sync.
- 39. COMPOSITE SYNC—Provides both line and field sync in the correct relationship.
- 40. COMPOSITE VIDEO—Provides the selected video output signal, complete with composite sync.
- 41. Fuse Holder
- 42. Power Receptacle—Mates with a 3-wire European type, power plug. Receptacle contains a line filter.

OPTION 1—143 is identical to standard instrument, except for the substitution of mini-QUICK^R connectors.

^R Registered trade mark of RADIALL.

OPERATING OPTIONS

The output signals from the 143, as programmed at the factory, answer most operating needs; however, not all signal requirements are for standard signals. To accommodate these varying requirements, a great deal of

flexibility has been built into the 143. The program changes require the repositioning of internal plug-jumpers, and should only be attempted by qualified service personnel. Complete change instructions are in Section 5.

PROGRAMMABLE OPTIONS

Test Patterns

The following test patterns are available for use at the SPLIT FIELD and TEST PATTERN outputs.

1. Reversed Color Bars
2. Black-Yellow-Red-Yellow-Black Vertical Bars
3. Phase-Sequenced Color Bars
4. White Only

Pulse Output Amplitudes

The COMPOSITE SYNC, COMPOSITE BLANKING, 7.8 kHz or LINE BLANKING, 12.5 Hz or FIELD BLANKING, FIELD DRIVE, LINE DRIVE and front-panel 7.8 kHz outputs are pre-programmed for a 4 V output. Changing one internal jumper sets the output amplitude of all the above mentioned outputs to either 2 V or 1 V. If the jumper is moved, the pulse rise- and fall-time adjustments will require re-adjusting.

Optional Pulse Outputs

LINE BLANKING and FIELD BLANKING outputs can be replaced by 7.8 kHz and 12.5 Hz square wave outputs. The front-panel 7.8 kHz output is not affected when LINE BLANKING is changed to 7.8 kHz or vice versa.

Crosshatch Option

The 143 is normally shipped with a 7 by 9 large-square crosshatch pattern. However, a 14 by 17 square pattern is available by changing the position of a single plug-jumper.

THE TEST PATTERNS

Color Bars

The 143 produces a standard color bar signal, nomenclated 100/0/75/0 per CCIR recommendation 471¹. In addition, several variations of this color bar signal are available, including variable amplitude. Fig. 2-3 shows the standard color bar signal as displayed on two adjacent lines on a waveform monitor.

Reversed Color Bars

The 143 is capable of producing color bars in a reverse order. This pattern is selected by an internal jumper change, placing the signal on the TEST PATTERN position of the WAVEFORM selector switch.

WARNING

Refer all jumper changes to a qualified service technician.

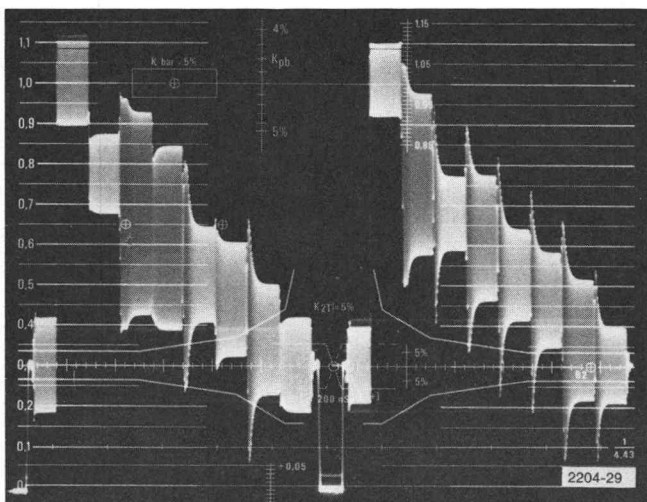


Fig. 2-3. A 2 line Waveform Monitor display of a 100/0/75/0 Color Bar; standard 143 Color Bar signal.

¹XII Plenary Assembly, New Delhi, Volume V, Part 2.

The waveform shown in Fig. 2-4 is the reversed color bar signal available as a program option. Note that the signal luminance level increases rather than decreases with each subsequent step. This signal can be available as the bottom fourth of a SPLIT FIELD signal or as a full field TEST PATTERN, if desired.

Black-Yellow-Red-Yellow-Black

This signal again is one that can be used as the TEST PATTERN signal or the bottom fourth of the SPLIT FIELD. It is a signal of great interest because it shows up chrominance/luminance timing errors in picture monitors. Fig. 2-5 is two adjacent lines displayed on the waveform monitor.

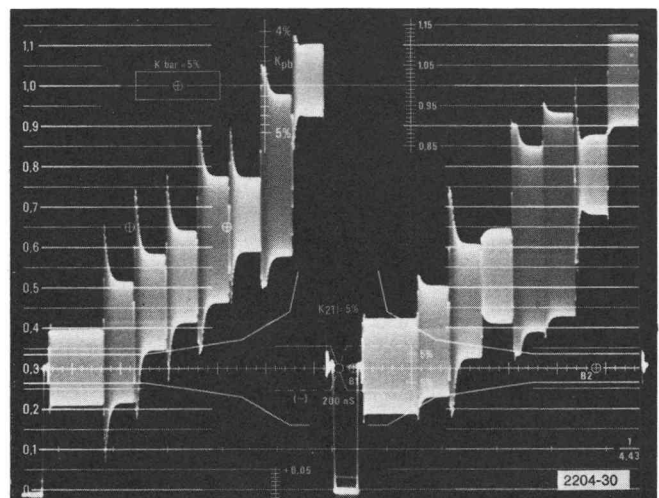


Fig. 2-4. Waveform Monitor display of reversed Color Bars.

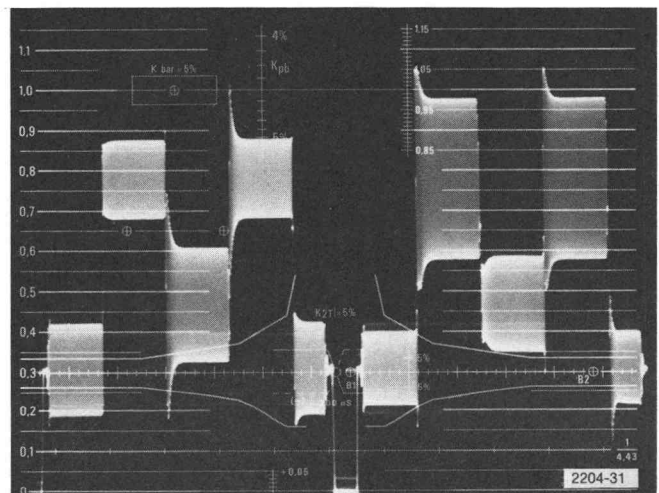


Fig. 2-5. 2 line Waveform Monitor display of the Black-Yellow-Red-Yellow-Black signal.

Phase-Sequenced Color Bars

This signal provides for the minimum changes in D'R or D'B from one color to the next. Fig. 2-6 is the Phase-Sequenced Color Bars displayed on the waveform monitor.

White Field

The remaining available TEST PATTERN signal is an all-white field, 100% luminance. Again, this signal may be selected as a full field signal or the bottom fourth of the SPLIT FIELD. This signal is used to calibrate color monitors. See the 653A or 656A Instruction Manual.

RED-GREEN-BLUE

The 143 has non-encoded Red, Green and Blue outputs for use with color encoders. This RGB signal, originating from the same timing source as the encoded color bar signal, can be used with the encoded color bar signal to check encoding accuracy.

GLOSSARY OF SECAM TERMS

Bell Filter (Cloche)—A filter whose characteristic is to increase the relative amplitude of the central frequencies.

Bottles—Another name for the field identification signals.

Clipping—Limiting the chrominance signal to a predetermined maximum value. Used in the SECAM system to limit the sequential chrominance signal to a range of FoB -350 kHz to FoR +350 kHz.

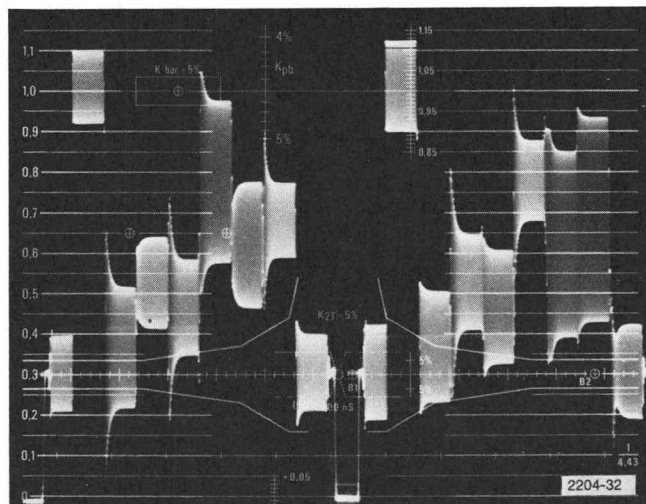


Fig. 2-6. 2 line Waveform Monitor display of Phase Sequenced Color Bar.

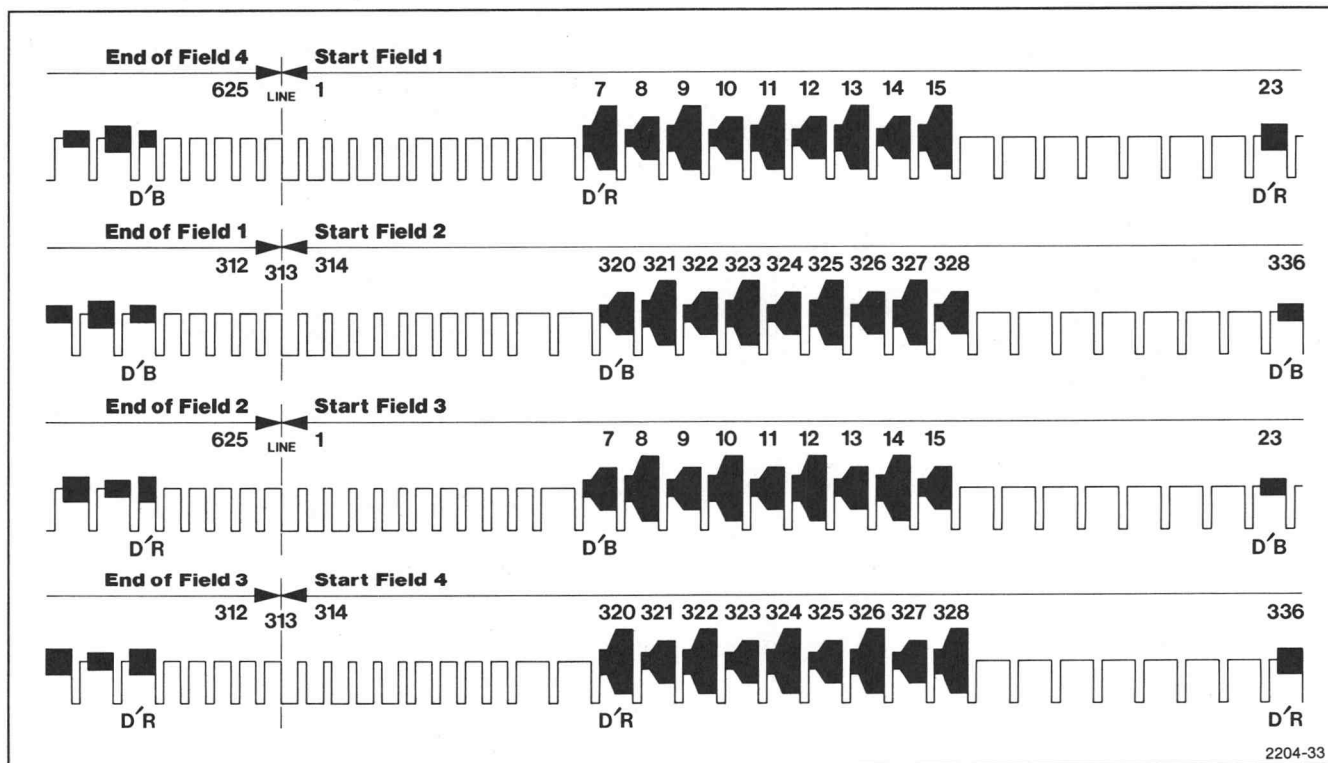


Fig. 2-7. SECAM signal Color Sequence from the 143.

Deviation—The amount of frequency shift, in an fm system, resulting from modulation.

Deviation Limits—The maximum deviation allowed by the system.

D'B—Blue chrominance signal proportional to the difference between blue and luminance.

D'R—Red chrominance signal, proportional to the difference between red and luminance.

Field Identification Signals—A system of alternately D'R, D'B modulated signals transmitted on lines 7 through 15 of each field's vertical interval.

FoB—The rest, or unmodulated frequency for the D'B signal, 4.25000 MHz.

FoR—The rest, or unmodulated frequency for the D'R signal, 4.40625 MHz.

Inverse Bell Filter (Anti-Bell)—A name for a type of Bell filter whose response is down at the center frequencies.

Line Burst—Subcarrier signal between the end of the line sync pulse and the start of the active line.

Line Suppression (of chrominance)—Period of time from the start of blanking to line burst.

NTSC—The American developed color television system. Initials stand for National Television Systems Committee.

PAL—The color system used in European countries not opting for SECAM. Initials stand for Phase Alternate

Lines; so named because of a 90 degree phase shift every other line.

Pre-emphasis—Emphasizing certain frequencies with respect to others. Used in the SECAM system to reduce the effects of noise and keep the subcarrier pattern from being objectionable on monochrome receivers.

Rest Frequency—The unmodulated carrier frequency in an fm system.

SECAM—Sequentiel a memoire.

Sequential Transmission—The method used in SECAM to transmit color difference signals on alternate lines.

Subcarrier Pre-emphasis—High frequency pre-emphasis, whose greatest effect is at frequencies farthest from the rest frequency.

Video Pre-emphasis—Low frequency pre-emphasis, whose greatest effect is on the higher frequencies of the color difference signals.

7.8 kHz—The repetition rate of either color difference signal.

12.5 Hz—The repetition rate of any one of the four SECAM fields.

The SECAM System

Detailed information on SECAM may be obtained from "SECAM Colour TV System", published by Compagnie Francaise De Television or "Colour Television" Volume 2 by P.S Carnt and G.B. Townsend, published by ILIFFE Books Ltd.

Section 3

OPERATOR'S MAINTENANCE

Normally, maintenance is thought of as repairs or recalibration of an instrument; however, many simple tasks, if performed at regular intervals, can extend the periods between failures. For example, keeping the area around the outside dust covers free of accumulated dust can prevent damage caused by an over-heated component. This section of the manual will outline some simple tasks that, if performed at regular intervals, could extend the period of time between major maintenance periods by as much as twenty-five percent.

In addition, this section will cover some areas that might prevent an erroneous indication of failure.

SUBCARRIER FREQUENCY CHECK

The accuracy of the output sync signals is directly related to the subcarrier frequency accuracy. To simplify matters, only the FoR need be checked at regular intervals. Under normal operating conditions, FoR accuracy should be checked at approximately 14-day intervals.

If the 143 has been idle for a prolonged period of time, a two-hour warm-up time should be allowed prior to measuring FoR accuracy.

The measurement is made by checking the front-panel SUBCARRIER FoR output with a digital counter, whose accuracy is at least 0.0001% (for example, TEKTRONIX DC 501 Opt. 1). FoR must remain at 4.406250 MHz \pm 4.4 Hz.

FUSE REPLACEMENT

The most common cause of total failure in electronic equipment is the correct operation of protective devices. In the case of the 143, its protective device is a fuse. Before assuming that the fuse is open, check that both ends of the power cord are plugged in, the switch is turned on, and that the POWER indicator is off.

WARNING

Before removing the 143 mains fuse, unplug the power cord.

In most cases, it is possible to determine if the fuse is open by visual inspection. However, if in doubt, use an ohmmeter to see if there is continuity through the fuse.

CAUTION

Always replace the mains fuse with the correct replacement fuse. If incorrectly fused, the 143 could be damaged.

Fig. 3-1 shows the rear-panel mains and fuse-value table. The placement of the indicator gives the correct fuse value for the 143 at the selected mains operating voltage. Section 9, Replaceable Electrical Parts list, gives the full description and Tektronix part number of the mains fuse. The entry is listed under F98. Be sure to replace the mains fuse only with the correct value fuse.

Should continued fuse failure occur, refer the problem to a qualified service technician.

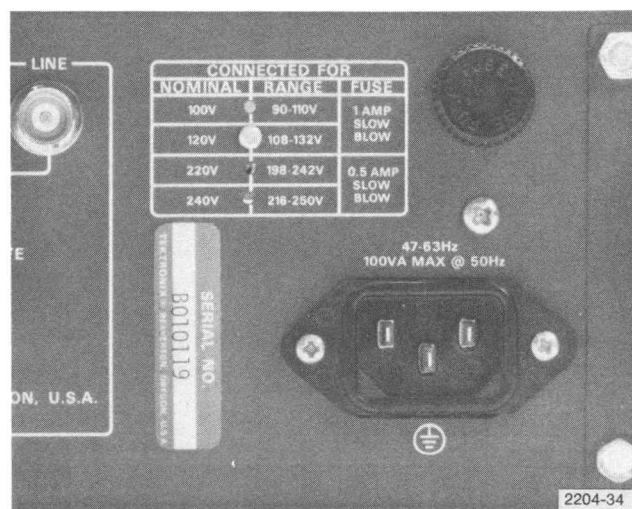


Fig. 3-1. Fuse chart.

EXTERIOR CLEANING

Dust Accumulation

The 143 is cooled by convection; therefore, it is essential that its air flow be as unrestricted as possible. A large buildup of dust on the dust covers will impede the flow of cooling air, allowing a buildup of heat within the 143. When internal temperatures reach extremes, component failure will occur.

To help ensure maximum interval between periods of corrective maintenance, always remove any dust that is accumulated on the dust covers.

Cleaning the Front Panel

During extended periods of operation, it is possible to nearly obliterate the front-panel nomenclature with a buildup of oil and grease and associated dust.

To clean the front panel of the 143, use a mild solution of detergent and water on a soft cloth. Use a soft dry cloth to remove the excess solution.

WARNING

Unplug the mains cord before using water to clean the front panel of this instrument.

CAUTION

Do not use harsh detergents or solutions that could remove the front-panel silk screening.

MINOR REPAIRS

Tighten Loose Knobs

Loose front-panel knobs can render certain functions of the 143 unusable. All four of the front-panel knobs can be tightened with a 1/16-inch Allen wrench.

Check Front-Panel Indicator Lights

With the 143 SYNCHRONIZATION switch set to INT and the POWER switch ON, all three front-panel indicator

lights should be lit. If they are not, refer to a qualified service technician for repair.

CORD AND CABLE INSPECTION

Power Cord

A potentially dangerous situation will occur if the power cord becomes frayed or does not make tight connection. Periodic inspection of the power cord is recommended.

Signal Cables

Damaged signal cables can cause two major problems; they can introduce hum on the signal path, or alter the return loss characteristics. Periodically check for cables that are damaged (such as pinched), have loose connectors, or show signs of deterioration from age. Promptly replace damaged cables. This could eliminate having to trace down a defective signal element at a later time.

Check 143 Input and Output Connectors

While checking the signal cables, check the 143 connectors for damage. Refer to a qualified service technician for repair.

MAINTENANCE SCHEDULE

Only operating personnel can determine the frequency of a routine maintenance schedule, based on the severity of the operating environment. As a general rule, calibration should be checked after 1000 hours of operation or 6 months; however a simple operational check, such as the Familiarization Procedure found in Section 1, can help to determine if all major functions of the 143 are operating.

Routine cleanings and inspections should be made as often as it is felt necessary. Obviously, a 143 that has been operating in an environment where it has a supply of filtered air and has not been subjected to repeated movement in and out of a rack does not require as much attention as one that has been used as a portable signal source.

To prevent small troubles from becoming major failures, always take corrective action promptly.

Section 4

SPECIFICATION

This section of the instruction manual details the Electrical, Mechanical, and Environmental specification of the 143 SECAM Test Signal Generator. This section also includes a short Glossary of Common TV Terms to assist in understanding this specification.

ELECTRICAL CHARACTERISTICS

The electrical Performance Requirements for this instrument are valid over the environmental limits given at the end of the specification. Calibration within an ambient temperature range of +20° to +30° Celsius and a warmup period of at least 20 minutes are required prior to achieving the stated accuracies.

Characteristics

Characteristics are the properties of the 143.

Performance Requirement

Items listed in the Performance Requirement column of the Electrical Characteristics can be verified by completing the Performance Check portion of the Performance Check/Adjustment Procedure in PART 2 of this manual.

Supplemental Information

Items listed in the Supplemental Information column of this specification are those for which no specific check procedures are given; however, when the entire Performance Check and Adjustment Procedure is performed, the information in this column is verified, either directly or as an essential part of the procedure steps.

Unless otherwise stated, all specification listings are for a normal signal, all front-panel switches in the up position.

Table 4-1
OUTPUT SIGNALS

| Characteristics | Performance Requirement | Supplemental Information | Perf. Ch. Step # |
|---|-------------------------|---|------------------|
| Composite Video | | | |
| Outputs | | Full Field or Split Field Color Bars or Test Pattern | |
| Return Loss | At least 36 dB to 7 MHz | | 55 |
| Isolation between Outputs | At least 40 dB | | 54 |
| Suppression of subcarrier at blanking | | At least 54 dB (referenced to nominal subcarrier Amplitude) | |
| Risetime of subcarrier envelope at blanking | | 400 ns \pm 100 ns | |

Table 4-1 (cont)
OUTPUT SIGNALS

| Characteristics | Performance Requirement | Supplemental Information | Perf. Ch. Step # |
|--------------------------------|---|--|------------------|
| Composite Video (cont) | | | |
| Bell Filter | | | |
| Center Frequency | 4.286 MHz \pm 20 kHz | | 33 |
| Response | \pm 0.5 dB of theoretical (sub-carrier -20 dB referenced to nominal amplitude). | | 10 |
| OFF | | Response flat \pm 0.5 dB, 3.9 to 4.75 MHz | |
| FoR | | | |
| Accuracy | 4.406250 MHz, \pm 4 Hz | | 5 |
| FoB | | | |
| Accuracy | 4.250000 MHz, \pm 4 Hz | | 6 |
| Chrominance/Luminance Timing | Within 50 ns (based on red-blue transition of the D'R line). | | 42 |
| Luminance Risetime | 100 ns \pm 10 ns | | 27 |
| Color Bar Signal ¹ | | | |
| Subcarrier Tolerance Frequency | \pm (1.3% of deviation +1 kHz) | | 24 |
| Amplitude | D'B line burst 166.7 mV \pm 10% (Subcarrier amplitude at other frequencies, relative to D'B line burst, determined by Bell filter tolerance). | | 34 & 41 |
| Variable | | Approximately +6 dB to -54 dB relative to nominal amplitude. | |
| Luminance Tolerance Amplitude | \pm 1% or 1.5 mV, whichever is greater. | | 28 |
| Detail | | See Table 4-2 | |

¹Specification for color bar signal based on the Normal Color Bar detail listed in Table 4-2.

Table 4-2
NORMAL COLOR BAR

(All switches except WHITE in the up position), Luminance amplitude referenced to blanking level.

| Ampli- tude Switch | Color | Lumi- nance Ampli- tude (V) | D'R | | | D'B | | | Perf. Check Step # |
|--------------------------|-----------------|--------------------------------------|-------------------------|-------------------------|----------------------------------|-------------------------|-------------------------|----------------------------------|-----------------------------|
| | | | Devi- ation (kHz) | Fre- quency (MHz) | P-to-P Ampli- tude (mV) | Devi- ation (kHz) | Fre- quency (MHz) | P-to-P Ampli- tude (mV) | |
| 75% | White | 0.5250 | 0.0 | 4.4063 | 214.5 | 0.0 | 4.2500 | 166.7 | 24 (Frequency Checks) |
| | Yellow | 0.4652 | -45.5 | 4.3607 | 183.8 | -230.0 | 4.0200 | 362.8 | |
| | Cyan | 0.3680 | +280.0 | 4.6863 | 476.0 | +77.6 | 4.3276 | 168.5 | |
| | Green | 0.3082 | +234.5 | 4.6407 | 431.9 | -152.4 | 4.0976 | 280.3 | |
| | Magenta | 0.2168 | -234.5 | 4.1718 | 212.3 | +152.4 | 4.4024 | 211.6 | |
| | Red | 0.1570 | -280.0 | 4.1263 | 252.2 | -77.6 | 4.1724 | 211.8 | |
| | Blue | 0.0599 | +45.5 | 4.4518 | 252.2 | +230.0 | 4.4800 | 277.5 | |
| 25% | White | 0.1750 | 0.0 | 4.4063 | 214.5 | 0.0 | 4.2500 | 166.7 | 41 (Amplitude Checks) |
| | Yellow | 0.1551 | -15.2 | 4.3911 | 203.3 | -76.7 | 4.1733 | 211.1 | |
| | Cyan | 0.1227 | +93.4 | 4.4997 | 295.8 | +25.9 | 4.2759 | 161.5 | |
| | Green | 0.1027 | +78.2 | 4.4845 | 281.7 | -50.8 | 4.1992 | 192.2 | |
| | Magenta | 0.0723 | -78.1 | 4.3282 | 168.7 | +50.8 | 4.3008 | 162.0 | |
| | Red | 0.0523 | -93.3 | 4.3130 | 164.2 | -25.9 | 4.2241 | 177.5 | |
| | Blue | 0.0200 | +15.2 | 4.4215 | 226.6 | +76.7 | 4.3267 | 168.2 | |
| 100% | White | 0.7000 | 0.0 | 4.4063 | 214.5 | 0.0 | 4.2500 | 166.7 | |
| | Yellow | 0.6202 | -60.7 | 4.3455 | 175.9 | -306.7 | 3.9433 | 449.2 | |
| | Cyan | 0.4907 | +350.0 | 4.7563 | 542.5 | +103.5 | 4.3535 | 179.9 | |
| | Green | 0.4109 | +312.6 | 4.7189 | 507.2 | -203.2 | 4.0468 | 333.5 | |
| | Magenta | 0.2891 | -312.6 | 4.0936 | 284.4 | +203.2 | 4.4532 | 253.4 | |
| | Red | 0.2093 | -373.3 | 4.0329 | 348.6 | -103.5 | 4.1465 | 233.7 | |
| | Blue | 0.0798 | +60.7 | 4.4670 | 265.7 | +306.7 | 4.5567 | 350.3 | |
| ---- | Black | 0.0000 | 0.0 | 4.4063 | 214.5 | 0.0 | 4.2500 | 166.7 | |
| ---- | Sync | -0.3000 | ---- | ---- | 0.0 | ---- | ---- | 0.0 | |
| ---- | Field Ident. | 0.0000 | +350.0 | 4.7563 | 542.5 | -350.0 | 3.9000 | 498.9 | |

Table 4-3
SYNC AND BLANKING

| Characteristics | Performance Requirement | Supplemental Information | Perf. Ch. Step # |
|-------------------|----------------------------|--|---------------------|
| Line Frequency | 15,625 Hz $\pm 0.0001\%$ | Digitally determined from sub- carrier frequency. | |
| Period | 64 μ s $\pm 0.0001\%$ | Digitally determined from sub- carrier frequency. | |

Table 4-3 (cont)
SYNC AND BLANKING

| Characteristics | Performance Requirement | Supplemental Information | Perf. Ch. Step # |
|---|-------------------------|---|------------------|
| Sync | | | |
| Pulse Duration | | $4.7 \mu\text{s} \pm 0.2 \mu\text{s}$ | |
| Pulse Amplitude | | −300 mV within 1% from blanking dc level. | |
| Front Porch | | $1.5 \mu\text{s} \pm 0.3 \mu\text{s}$ | |
| Pulse Risetime (10-90%) | | $0.2 \mu\text{s} \pm 0.02 \mu\text{s}$ | |
| Interval (sync leading edge to end of subcarrier blanking). | | $5.6 \mu\text{s} \pm 0.2 \mu\text{s}$ | |
| Blanking | | | |
| Duration | | $12 \mu\text{s} \pm 0.3 \mu\text{s}$ | |
| DC Level | 0 V within 100 mV | | 29 |
| Field | | | |
| Frequency | 50 Hz | Digitally determined from sub-carrier frequency. | |
| Period | 20 ms | Digitally determined from sub-carrier frequency. | |
| Sync | | | |
| Equalizing | | | |
| Pulse Duration | | $2.35 \mu\text{s} \pm 0.1 \mu\text{s}$ | |
| Sequence Duration | | 2.5 lines | |
| Synchronizing | | | |
| Pulse Duration | | $27.3 \mu\text{s} \pm 0.2 \mu\text{s}$ | |
| Sequence Duration | | 2.5 lines | |
| Risetime (10-90%) | | $0.2 \mu\text{s} \pm 0.02 \mu\text{s}$ | |
| Blanking | | | |
| Duration | | $1.6 \text{ ms} + (12 \mu\text{s} \pm 0.3 \mu\text{s})$ | |
| Dc Level | | 0 V within 100 mV | |

Table 4-4
NON-ENCODED OUTPUT

| Characteristics | Performance Requirement | Supplemental Information | Perf. Ch. Step # |
|------------------------|--|--------------------------|------------------|
| Red-Green-Blue Outputs | | | |
| Amplitude | 525 mV $\pm 1\%$ (except white, 700 mV). | | 45 |
| Sync | −300 mV $\pm 2\%$ green only (can be deleted by moving internal jumper). | | 45 |
| Return Loss | At least 36 dB to 6 MHz | | 55 |

Table 4-5
PULSE OUTPUTS

| Characteristics | Performance Requirement | Supplemental Information | Perf. Ch. Step # |
|-------------------------|---|---|------------------|
| Pulse Outputs Available | | Composite Sync Composite Blanking 12.5 Hz Square Wave Field Drive Line Drive 7.8 kHz Square Wave | |
| Alternate Outputs | | | |
| Field Blanking | | Replaces 12.5 Hz Square Wave (internal jumper change). | |
| Line Blanking | | Replaces 7.8 kHz Square Wave (internal jumper change). | |
| Amplitude | | 1, 2, or 4 V negative-going from ground. See Section 5, Operating Changes. | |
| Composite Sync | Identical to Sync contained in the Composite Video, Table 4-3, except risetime. | | |
| Composite Blanking | Identical to blanking as described in Table 4-3. | | |
| Line Blanking Duration | 12 μs ± 0.3 μs | Digitally determined from sub-carrier frequency. | |
| Field Blanking Duration | | 1.6 ms + (12 μs ± 0.3 μs) | |

Table 4-5 (cont)
PULSE OUTPUTS

| Characteristics | Performance Requirement | Supplemental Information | Perf. Ch. Step # |
|--|---|---|------------------|
| Line Drive Duration | $4.7 \mu\text{s} \pm 0.2 \mu\text{s}$ | Digitally determined from sub-carrier frequency. | |
| Field Drive Duration | | 5 lines | |
| 12.5 Hz Square Wave Repetition Rate | | 1 cycle/4 fields (12.5 Hz) | |
| Levels | | Ground for fields 1 & 2, negative for fields 3 & 4. | |
| 7.8 kHz Square Wave Repetition Rate | | 1 cycle/2 lines (transition at leading edge of line drive). | |
| Levels | | Ground for D'R, negative for D'B. | |
| Outputs Risetime (10-90%) | $0.25 \mu\text{s} \pm 0.05 \mu\text{s}$ (all pulse outputs listed). | | 43 |
| Return Loss | At least 30 dB to 4 MHz (all pulse outputs listed). | | 55 |
| Subcarrier Output FoB-FoR Subcarrier | Approximately 1 V into 50Ω (for frequency counter). | | 43 |

Table 4-6
GEN LOCK

| Characteristics | Performance Requirement | Supplemental Information | Perf. Ch. Step # |
|--------------------------|--|---|------------------|
| Sync | | | |
| Source | | Nominal 1 V composite video. | |
| Input Configuration | | 75 Ω loop-thru | |
| Return Loss | At least 46 dB to 5 MHz | | 55 |
| Sync Amplitude | | −300 mV, within 10 dB. | |
| Sync Acquisition Time | | Less than 0.6 seconds. | |
| D'R—D'B Lock-up Level | Subcarrier amplitudes from +6 dB to −18 dB of nominal. | | 15 |
| D'R—D'B Drop-out Level | | Subcarrier amplitudes less than −18 dB of nominal. | |
| D'R—D'B Acquisition Time | | | |
| Line | | Less than 100 lines (referenced to line burst). | |
| Field | Less than 300 ms (referenced to field identification signals). | | 16 |
| Line Sync Delay | | | |
| Range | | Adjustable to advance or delay 143 Sync at least 500 ns. | |
| Stability | | Within 70 ns over operating temperature range. | |
| Jitter | | 5 ns or less. | 18 |
| Lock-up Range | | | |
| Gen-Lock | | 15.625 kHz $\pm 0.0005\%$ (subcarrier is asynchronous with respect to line for line rates above and below tolerance). | |
| Sync-Lock | | 15.625 kHz to $\pm 0.1\%$. | |

Table 4-7
CONVERGENCE

| Characteristics | Performance Requirement | | Supplemental Information | Perf. Ch. Step # |
|---------------------------|-------------------------|-----------------------|--|------------------|
| Convergence Output | | | | |
| Pedestal (Dc Level) | 0V | | | 49 |
| Sync Amplitudes | -300 mV $\pm 5\%$ | | | 48 |
| Peak Luminance Level | 525 mV $\pm 5\%$ | | | 48 |
| Isolation | At least 40 dB | | | 54 |
| Return Loss | At least 35 dB to 5 MHz | | | 55 |
| Displays | | | Vertical lines Horizontal lines Dots Any combination of lines and dots. | |
| Crosshatch Pattern | | | | |
| Vertical | 7 X 9 | 14 X 17 | | |
| Line Interval | 6.3 μ s | 3.18 μ s | | 51 & 52 |
| Pulse Time Position Range | At least 6.3 μ s | At least 3.18 μ s | Overlap of one vertical line time. | 53 |
| Unblanked Pulses | 8-9 | 16-17 | Dependent on front-panel POSITION control. | 51 & 52 |
| Pulse Duration | 200 ns ± 30 ns | | | 50 |
| Dot Duration | 200 ns ± 30 ns | | | 50 |
| Pulse Polarity | | | Positive | |
| Horizontal | | | 7 X 9 | 14 X 17 |
| Line Interval | | | 46 lines | 21 lines |
| Pulse Time Position Range | | | At least 2.9 ms | At least 1.4 ms |
| | | | Overlap of one horizontal line time. | |
| Unblanked Pulses | | | 6-7 | 13-14 |
| | | | Dependent on Front-panel POSITION control. | |
| Pulse Duration | | | 2 lines per picture | |
| Pulse Polarity | | | Positive | |
| Pattern Selection | | | Internal jumper | |

Table 4-8
POWER SUPPLY

| Characteristics | Performance Requirement | Supplemental Information | Perf. Ch. Step # |
|---------------------------|-------------------------|--------------------------|------------------|
| Power Requirements | | | |
| Maximum Power Consumption | | 100 watts | |
| Mains Frequency Range | | 48 to 62 Hz | |
| Crest Factor | | 1.35 or more | |
| Mains Voltage Range | Regulating Range | | 4 |
| 100 V | 90 to 110 Vac | | |
| 120 V | 108 to 132 Vac | | |
| 220 V | 198 to 242 Vac | | |
| 240 V | 216 to 250 Vac | | |

Table 4-9
PHYSICAL CHARACTERISTICS

| Characteristic | Information |
|----------------|---|
| Length | 18.5 inches (47 cm) |
| Width | 19 inches (48.3 cm) |
| Height | 3.5 inches (8.9 cm) |
| Net Weight | 20 pounds (approx. 9.1 kg) (less rackmount hardware) |

ENVIRONMENTAL CHARACTERISTICS

The following environmental test limits apply when the instrument is tested in accordance with the recommended test procedure. This instrument will meet the electrical performance requirements given in this section following an environmental test.

TEMPERATURE

NON-OPERATING: -40°C to $+65^{\circ}\text{C}$
 OPERATING RANGE: 0°C to $+50^{\circ}\text{C}$

ALTITUDE

NON-OPERATING: To 50,000 feet
 OPERATING RANGE: To 15,000 feet

GLOSSARY OF COMMON TV TERMS

ACTIVE VIDEO LINES: All video lines not occurring in the field blanking interval.

APL: Average Picture Level. The average signal level, with respect to the blanking level, during the active video lines, expressed as a percentage of the difference between blanking level and reference white levels.

BACK PORCH: The portion of the composite video signal that lies between the trailing edge of the line sync pulse and the trailing edge of the line blanking pulse.

BLANKING LEVEL: The level of a composite video signal that serves to separate the picture information from the area containing synchronizing information. Nominally 300 mV in the EBU countries.

CHROMINANCE: The colorimetric difference between a color and an equal luminance reference color. The reference color having specific chromaticity.

COLOR BARS: A test signal typically containing eight basic colors: white, yellow, cyan, green, magenta, red, blue, and black. It is used to check chrominance functions of color television systems.

Specification—143 SECAM

COMPOSITE SYNC: The line and field rate synchronizing pulses, including the field equalizing pulses, combined together to form a synchronizing signal.

COMPOSITE VIDEO: Combined synchronizing, blanking, luminance, chrominance, and color synchronizing signals, forming a usable picture signal.

EQUALIZING PULSES: A pulse train whose pulse repetition rate is double the line frequency, occurring just prior to and just after the field synchronizing pulse. This signal is used to keep the line sweep circuits synchronized during the vertical retrace and facilitate interlaced scanning.

FIELD: One of two, or more, equal parts of a television picture. Scanning systems require two fields to create a picture; however, two pictures are required to complete the entire color sequence.

FIELD BLANKING: The blanking signal that occurs at the end of each field. Also called vertical blanking.

FIELD BLANKING INTERVAL: The blanked portion of the composite video signal at the beginning of each field. This is the part of the signal containing the field synchronizing pulse, equalizing pulses, and the Insertion Test Signal. In the SECAM system, lines 7 through 15 of this interval carry the field identification signals (Bottles).

FIELD FREQUENCY: The rate at which one complete field is scanned, normally 50 times per second in SECAM systems.

HORIZONTAL: Used interchangeable with 'line'.

LINE BLANKING: The blanking signal at the end of each scanning line. It is used to make the horizontal retrace (on picture monitors, etc.) invisible. Also referred to as horizontal blanking.

LINE FREQUENCY: The number of horizontal scans (lines) per second, 15,625 times per second in 625-line scanning systems.

LUMINANCE: The quantity that produces the sensation of brightness, equally important to the chrominance signal in providing the total color signal. Commonly referred to as the Y or Y component.

SYNC: An abbreviation for the word synchronization. Applies to the timing pulses used to lock the scanning rates of other parts of the television system to the scanning rate of the picture originator; for example, the picture monitor to the generator or camera.

VERTICAL: Used interchangeably with 'field'.

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.

PART II

SERVICE INFORMATION

This part of the instruction manual contains the information required to maintain the 143. With the possible exception of the Theory of Operation, Section 7, it is intended solely for the qualified service technician.

It is good practice to always have someone trained in first-aid, especially resuscitation, present when working with energized circuits, even though the hazard may appear minimal.

WARNING

Electrical shock hazards are present inside this instrument. Only qualified service personnel should remove the instrument covers.

Avoid Live Circuits

Electrical shock hazards are present in this instrument, especially in the power-supply primary circuits. Areas of possible contact with dangerous potentials include fuse holder, the power switch, and the power-transformer primary connections.

WARNING

To reduce electrical shock hazard, the instrument chassis must be properly grounded. Refer to Section 5 under the heading 'Electrical Requirements' for further details.

Section 5

INSTALLATION

Unpacking

Carefully inspect the instrument, any damage should be reported to the carrier immediately.

If further shipment of this instrument (such as to a service center) is anticipated, save the packaging materials. This package provides the maximum protection for the instrument.

Electrical Requirements

Power Source. This instrument is intended to operate from a single-phase power source having one of its current-carrying conductors at or near ground (the neutral). Only the line conductor is fused for over-current protection. Systems that have both current-carrying conductors live with respect to ground, such as phase-to-phase or multi-phase systems, are not recommended power sources.

The 143 has a 3-terminal polarized plug and cord for connection to the power source and earth ground. The earth-ground terminal of the plug is directly connected to the metal chassis of the instrument. For electrical shock protection, insert this plug in a mating outlet with earth-ground contact.

Table 5-1 gives the conductor color codes of power cords used in Tektronix instruments.

Table 5-1

POWER CORD CONDUCTOR COLOR IDENTIFICATION

| Conductor | Color | Alternate Color |
|--------------------|--------------|-----------------|
| Ungrounded (Line) | Brown | Black |
| Grounded (Neutral) | Blue | White |
| Grounding (Earth) | Green-Yellow | Green-Yellow |

Power Cord Adaptors. If a 3-to-2 wire adaptor is used to connect the 143 to a 2-wire outlet, an extra connection from the ground lead to earth ground will be necessary. Failure to complete the ground may allow the metal parts of the 143 to be elevated above earth ground and create an electrical shock hazard.

Mains Frequency and Voltage Range

The 143 operates over a frequency range of 48 to 62 Hz and a mains voltage center value of 100 Vac, 120 Vac, 220 Vac, and 240 Vac. Fig. 5-1 shows the power-transformer primary connections for use with any one of the four mains ranges.

OPERATING CHANGES

In addition to the mains frequency and voltage ranges, it is possible to alter some of the 143's signal parameters or even the signal itself.

Output Pulses

The 143 is shipped with 7.8 kHz and 12.5 Hz pulse outputs. These can be changed to LINE BLANKING and FIELD BLANKING respectively.

LINE BLANKING, P586. The rear-panel (only) 7.8 kHz Pulse Output can be changed to the LINE BLANKING Pulse Output. This signal, like the other output pulses, is available in 4 V, 2 V, or 1 V amplitudes. See Pulse Amplitude Change.

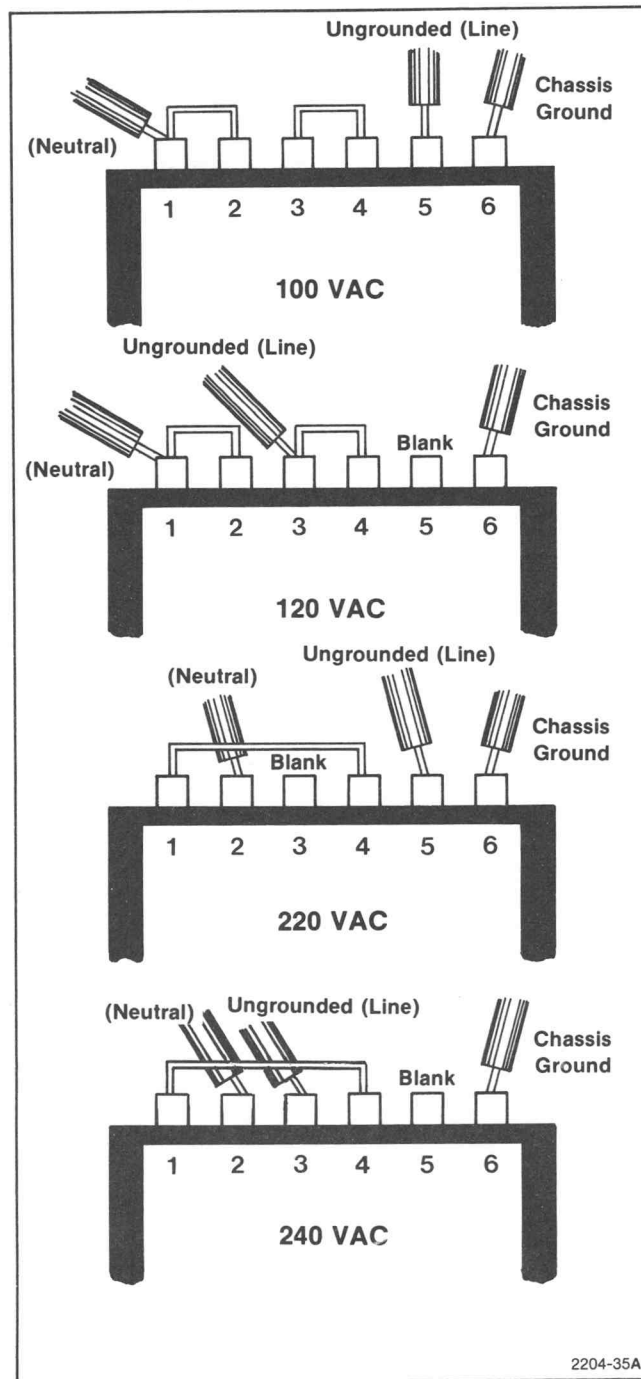


Fig. 5-1. Transformer Primary Wiring.

Fig. 5-2 shows the plug jumper, P586, that is moved to obtain rear-panel LINE BLANKING pulse output.

The 143 rear-panel output jack is double labeled. The LINE BLANKING label is also present, but may be concealed.

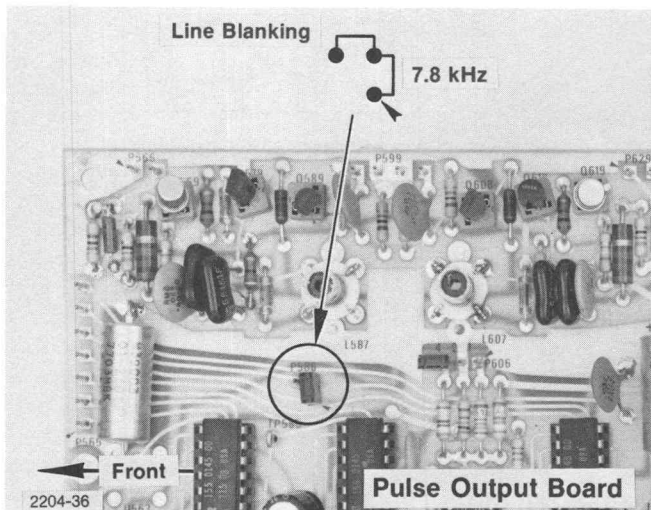


Fig. 5-2. P586, 7.8 kHz or Line Blanking.

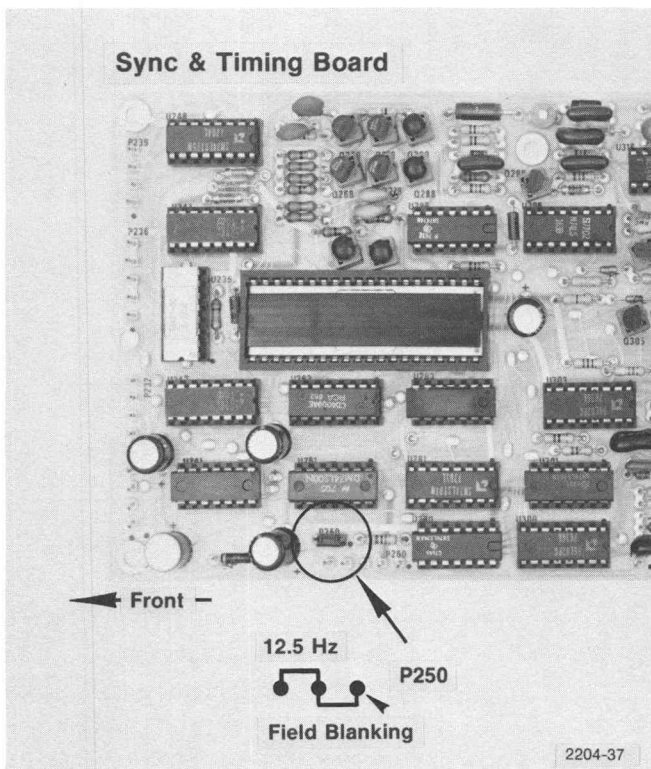


Fig. 5-3. P250, 12.5 Hz or Field Blanking.

FIELD BLANKING, P250. The rear-panel 12.5 Hz output can be changed to provide a FIELD blanking output. Fig. 5-3 shows P250, the plug jumper that is moved to change the output. This signal, like the 12.5 Hz signal, is also available in 4 V, 2 V, or 1 V amplitudes. See Pulse Amplitude Changes for more information.

The rear-panel 12.5 Hz output is double labeled; the FIELD BLANKING label may be concealed.

PULSE AMPLITUDE, P606. LINE DRIVE, 12.5 Hz (or FIELD BLANKING), 7.8 kHz (or LINE BLANKING), COMPOSITE BLANKING, COMPOSITE SYNC, and FIELD DRIVE have selectable output amplitudes. Normal pulse output is 4 V, but 2 V or 1 V output amplitude can be selected. The amplitude of all 6 pulses is changed by moving one plug jumper, P606. See Fig. 5-4. If 1 V output amplitude is selected, jumpers P561, P571, P581, P591, P601, P611, P621, and P631 (Fig. 5-5) need to be moved to the 1 & 2 position. Whenever the pulse amplitude is changed, the risetime adjustments for the pulse outputs must be re-adjusted. C560, C570, C580, C590, C600, C610, C620, and C630 need to be re-adjusted according to the instructions contained in the adjustment portion of the procedure in Section 6 of this manual.

When the 143 12.5 Hz pulse is used to provide the SECAM pulse to a TEKTRONIX 1481 or 1485 Option 8 Waveform Monitor, the amplitude of that pulse must remain 4 V.

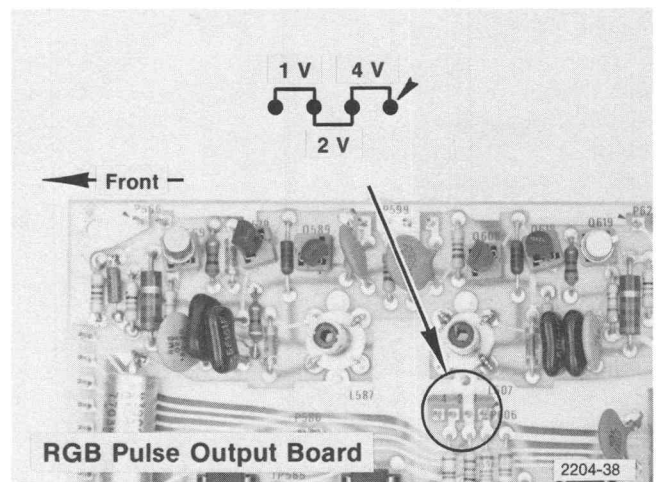


Fig. 5-4. P606 Pulse Amplitude changes 4 V, 2 V, or 1 V.

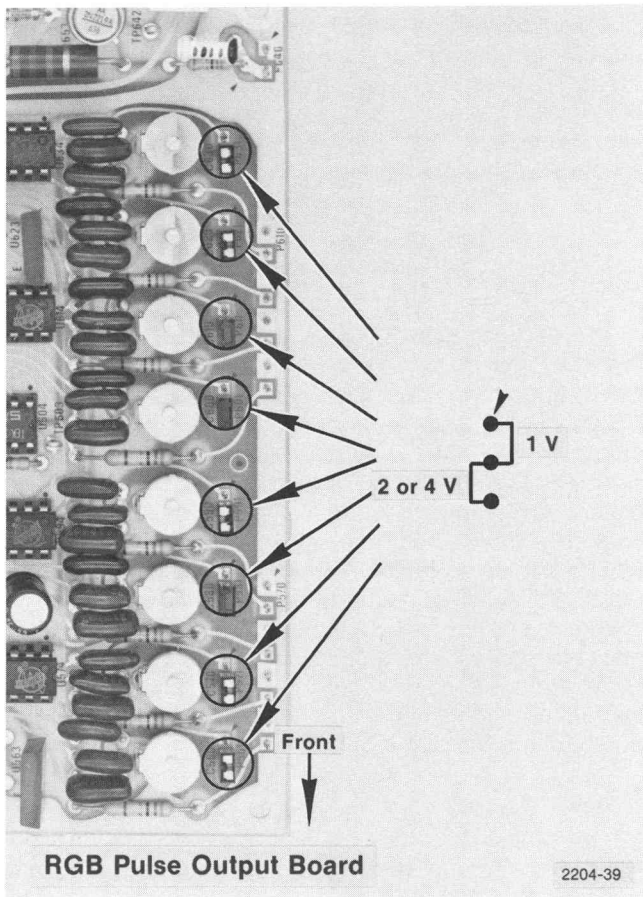


Fig. 5-5. P561-P631 changing Pulse Risetime for 1 V Pulse Output.

TEST PATTERN SELECTION, P866 and P876. The 143 is shipped with the black, yellow, red, yellow, black test pattern. This pattern is available either full field or split field, depending on the setting of the front-panel WAVEFORM switch. This pattern may be changed. Fig. 5-6 and Table 5-2 provide the location and programming of P866 and P876 for the other patterns.

Table 5-2

| Signal | P866 | P876 |
|-------------------------------|-------|-------|
| Black-Yellow-Red-Yellow-Black | 1 & 2 | 2 & 3 |
| White | 2 & 3 | 2 & 3 |
| Phase Sequenced Color Bars | 2 & 3 | 1 & 2 |
| Reversed Color Bars | 1 & 2 | 1 & 2 |

GREEN SYNC, P679. Fig. 5-7 shows P679, which is used to add or delete sync for RGB operation. As pre-programmed, the GREEN output contains sync. Moving P679 to the 2 & 3 position will delete sync.

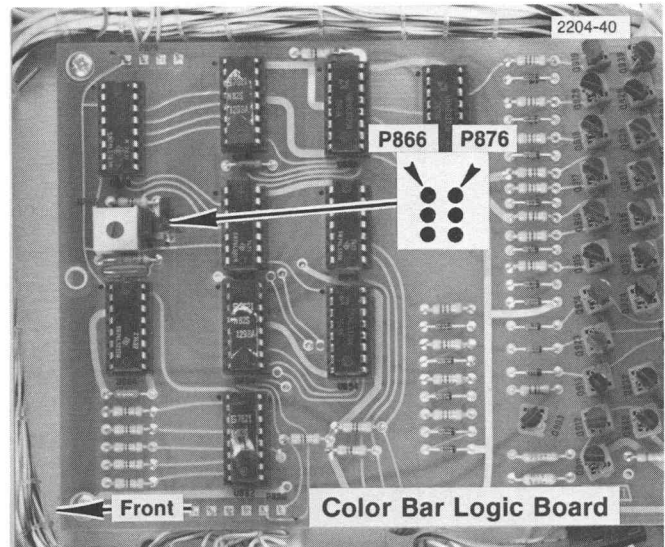


Fig. 5-6. Test pattern selection P866 and P876.

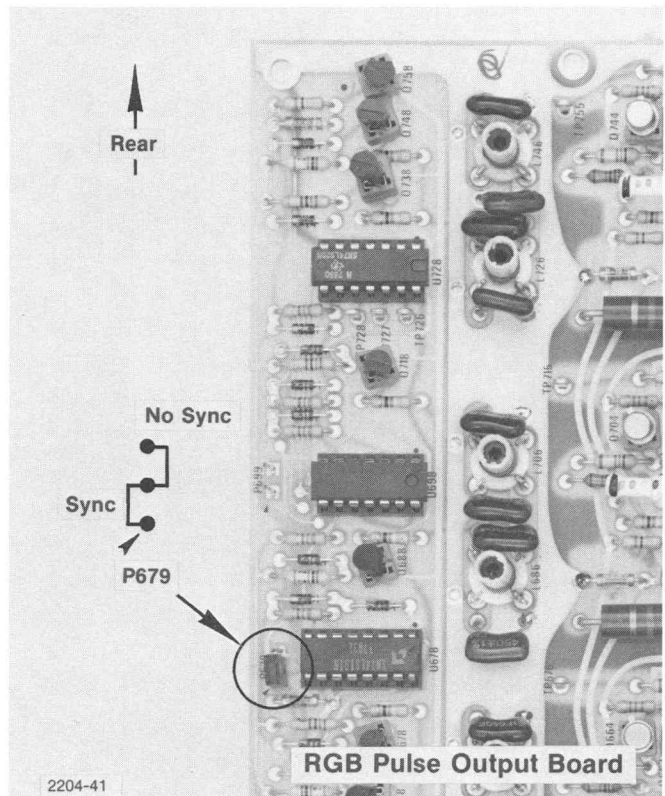


Fig. 5-7. Green Sync P679.

CROSSHATCH SIZE, P852. Two sizes of crosshatch pattern are available, 7 by 9 squares or 14 by 17 squares. P852 is used to change pattern size. Position 2 & 3 provides the large squares, 1 & 2 the small. Fig. 5-8 shows the location of P852.

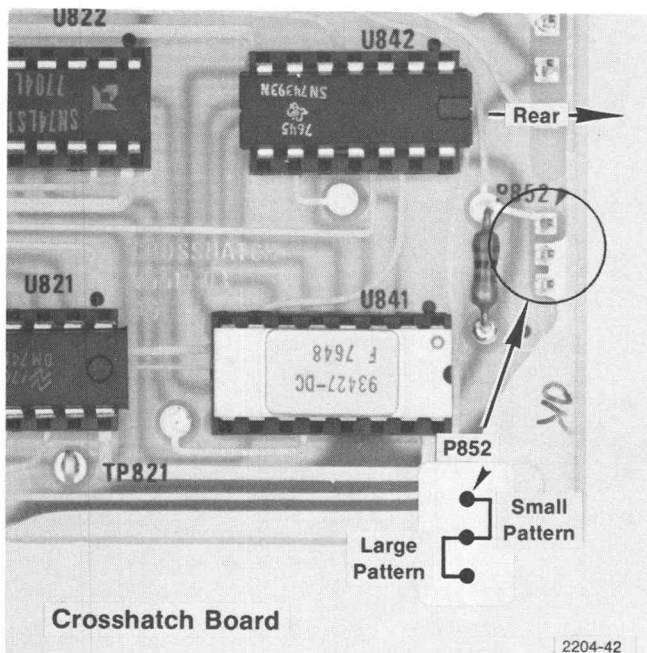


Fig. 5-8. P852 Crosshatch Size.

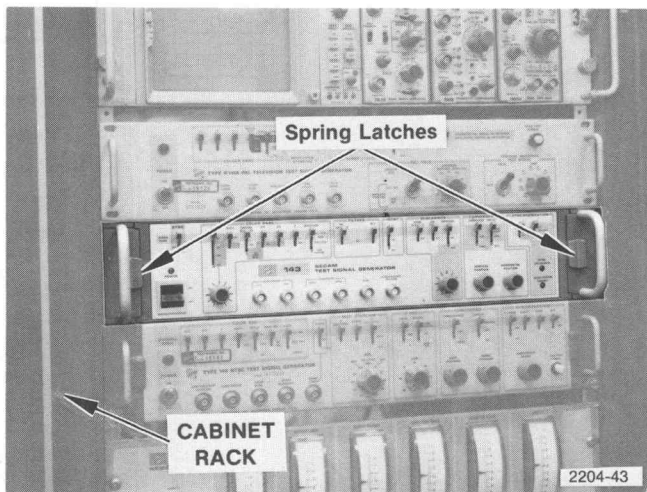


Fig. 5-9. 143 Correctly mounted in a cabinet type rack.

RACKMOUNTING INSTRUCTIONS

The 143 will fit most commercial consoles and 19 inch wide racks, whose front and rear rail-holes conform to Universal, EIA, RETMA and Western Electric hole spacing. Vertical opening required for the 143 is 3 1/2 inches.

Figure 5-9 shows the 143 SECAM Test Signal Generator installed in a cabinet-type rack with 1 3/4-inch wide tracks for a non-tilt installation. The instrument is secured into the rack by means of spring latches. When the latches are pushed toward the center, the 143 can be pulled out of the rack like a drawer. It can be fully extended, as shown in Fig. 5-10, or partially extended if desired. Only the fully-extended position has restraining latches to prevent the 143 from being accidentally slid back. By fully extending the 143, its dust covers can be removed and many routine maintenance operations can be accomplished without removing it from the rack.

The slide-out tracks easily mount to the cabinet rack front and rear vertical mounting rails, if the inside distance between rails is from 10 1/2 inches to 24 1/2 inches. Some means of support, such as additional supports for the rear mounting brackets, will need to be fabricated if the slide tracks are going to be installed in a cabinet rack whose depth is less than 10 1/2 inches or greater than 24 1/2 inches.

Mounting Dimensions

Width. The 143 was designed to be used in a standard 19-inch rack. The required minimum opening between front mounting rails is 17 5/8 inches, see Fig. 5-10. This spacing allows room on each side of the 143 for the slide-out tracks to operate freely. If the opening between the front mounting rails exceeds approximately 18 inches, it will be necessary to develop special adaptors.

Depth. The 143 total depth is 19 inches. For proper circulation of cooling air, allow at least 2 inches clearance behind the instrument. If it is necessary, or desirable to operate the 143 in its fully extended position, use cables that provide at least 22 1/2 inches of slack when the instrument is latched into the rack.

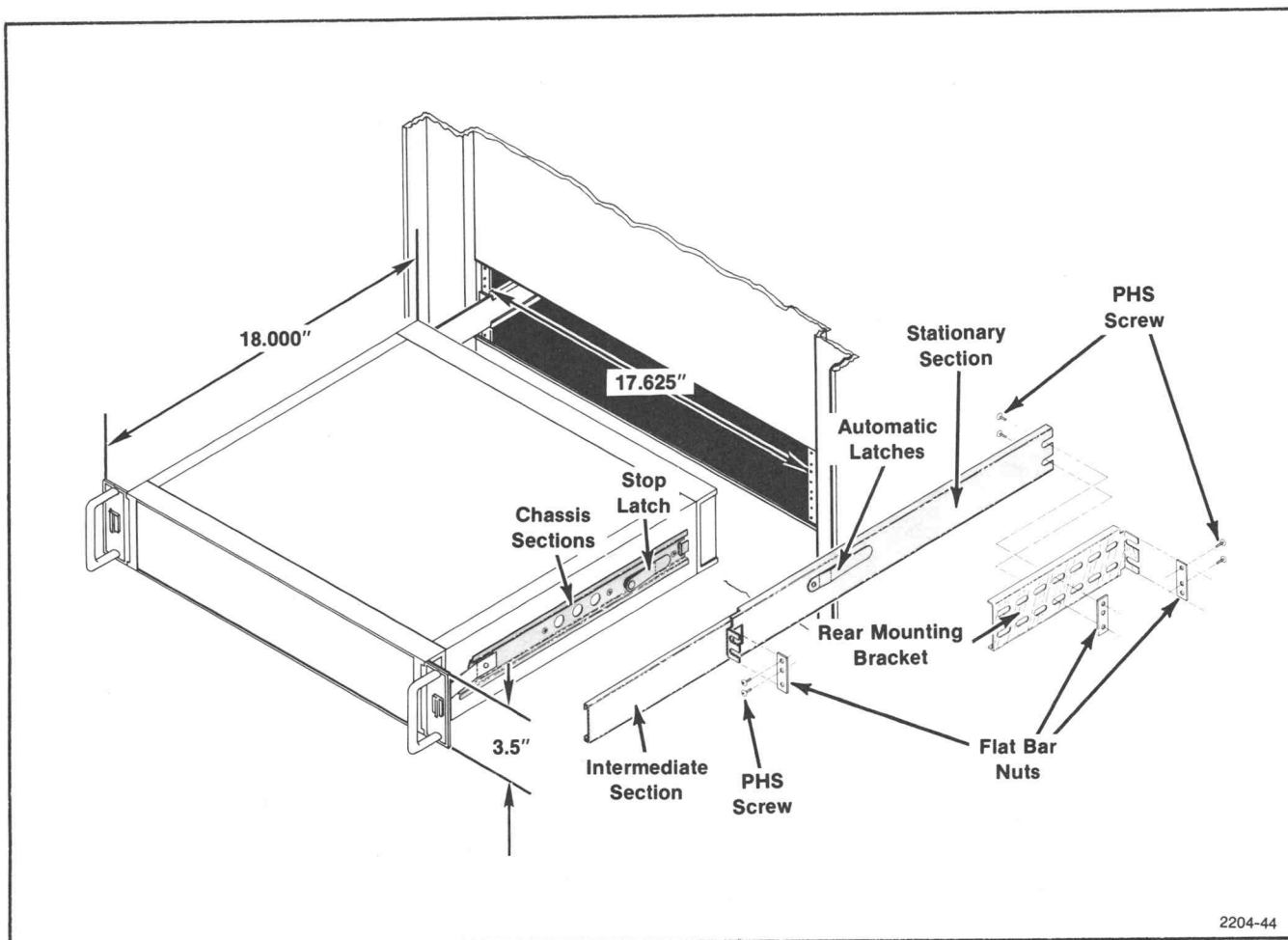


Fig. 5-10. 143 fully extended showing slide out tracks and dimensions.

Rackmounting

General. The slide-out tracks for the 143 consist of two assemblies; one for the right side of the chassis and one for the left. Each assembly consists of three sections, as shown in Fig. 5-11. The stationary section mounts permanently to the rack mounting-rails. The chassis section attaches to the 143 and is normally installed at the factory. The other, or slide section, mates the two fixed sections and allows the 143 to be extended from the rack.

The small hardware that is supplied with the slide-out tracks is shown in Fig. 5-11.

The stationary and slide sections of the slide-out tracks are shipped as matched sets and should not be separated. To identify whether a set is for the right or left side, observe the automatic catch, between stationary and sliding section. It should be at the top of the sections.

Mounting Procedure. Use the following procedure for mounting the 143 in the rack.

1. Select the stationary section mounting holes. The 143 requires 3 1/2 inches of vertical space. If the 143 is to be mounted directly under another instrument, the **top** mounting screw for the stationary section will be 1 1/2 inches below the panel of the instrument above. If it is to be mounted directly above another instrument, the **bottom** mounting screw for the stationary section should be 1 1/2 inches above the panel below. See Fig. 5-12 for dimensions.

2. Mount the stationary sections of the slide-out track to the front rack-rails by one of the following methods, depending on whether the rails are tapped or not.

- a. Using Fig. 5-13A as a guide when the front rails are tapped, mount the flange of the stationary section in front of the rack rail and secure with the pan head screws (PHS).

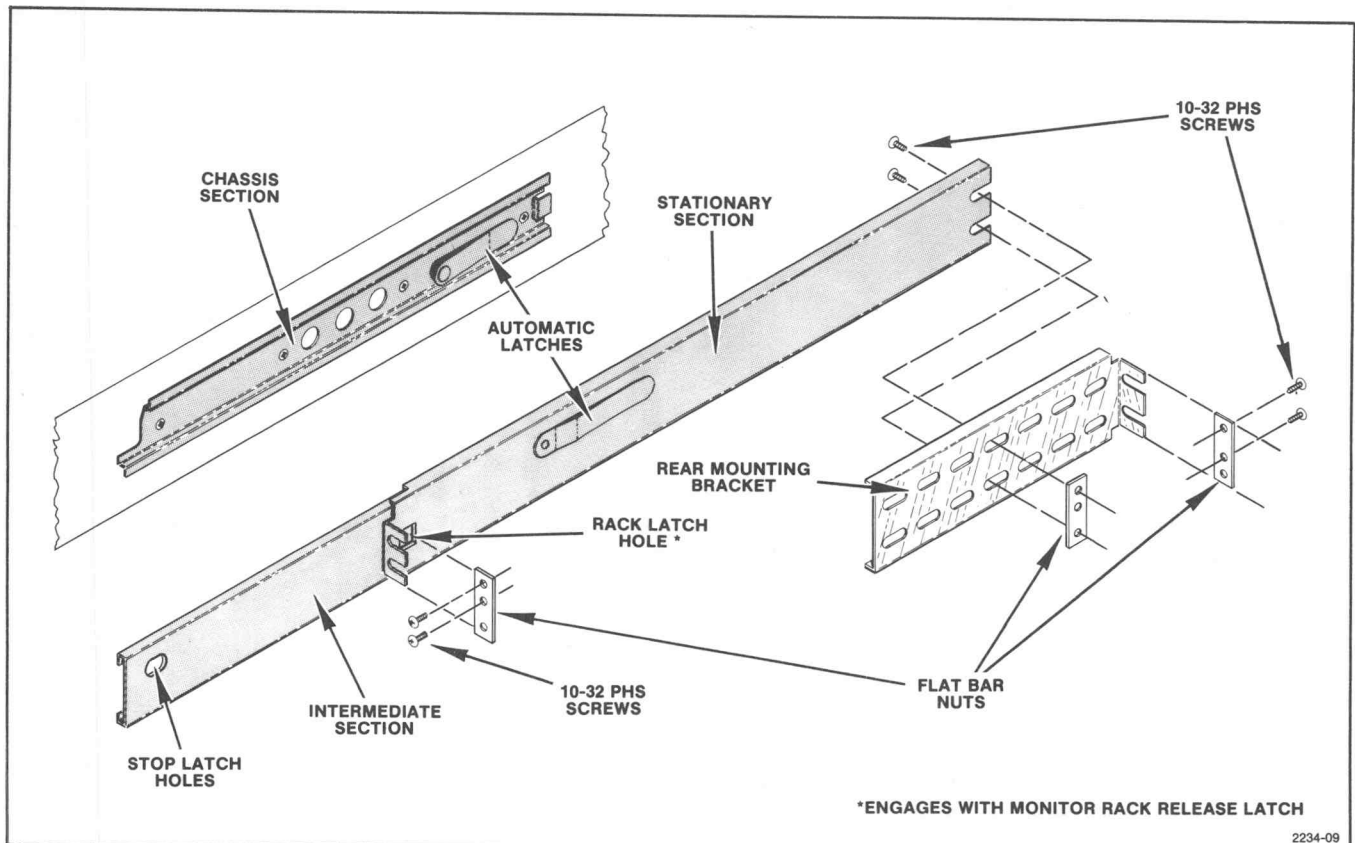


Fig. 5-11. Exploded view of rackmounting hardware.

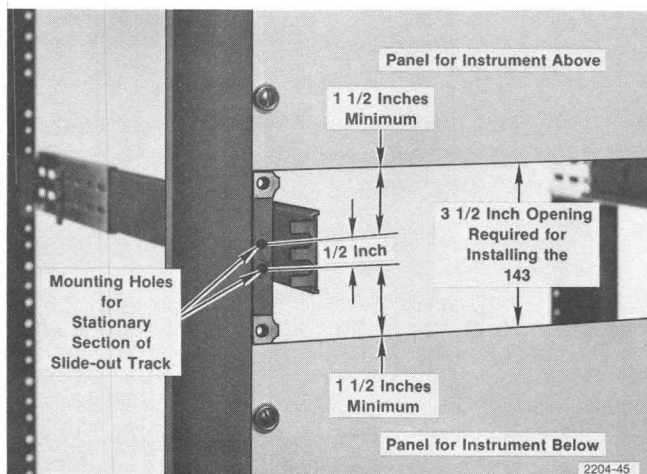


Fig. 5-12. Dimensions for mounting front of stationary sections.

b. If the front rails are not tapped, use Fig. 5-13B and mount the front of the stationary section by placing the flange in front of the rail and a bar nut behind the rail. Secure with pan head screws (PHS).

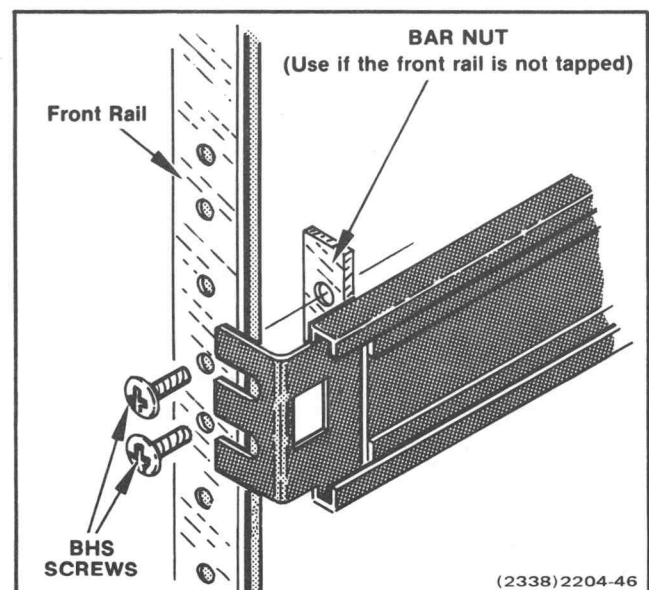


Fig. 5-13. Mounting front of stationary sections.

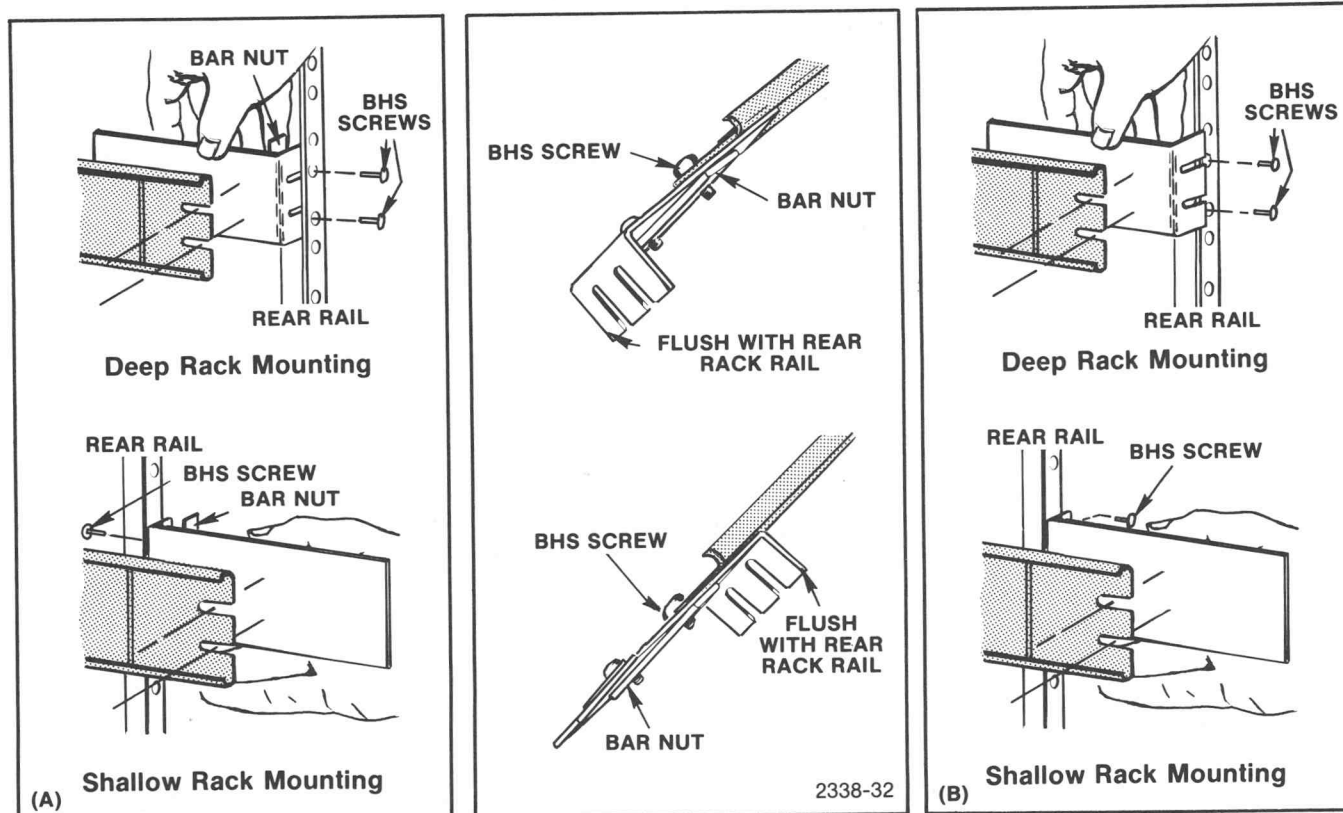


Fig. 5-14. Rear bracket mounting. a. Deep rack. b. Shallow rack.

3. Mount the rear mounting bracket to the rear rack-rails. Align the bracket with the stationary section and secure to the rear rail in either of the methods shown in Fig. 5-14. The flange can be mounted either in front of or behind the rear rack-rail using the bar nut or tapped rails. Use pan head screws.

4. Attach the stationary section to the mounting bracket, with a bar nut on the outside of the bracket, and flat head screws (FHS) (see Fig. 5-14).

5. Pull the slide sections out until the safety catch engages. Install the 143 on the slide tracks and push in until the latches on the chassis section engage. Depress the latches and push the 143 into the rack (see Fig. 5-15).

6. Adjust the slide-out tracks as follows:

a. Loosen both front and rear stationary section mounting screws.

b. Exercise the slides by moving the 143 in and out slightly. This will allow the proper width for smooth operation of the slides.

c. Re-tighten front and rear stationary section mounting screws (see Fig. 5-16).

d. Check to see that the front latches engage and keep the 143 firmly in the rack.

Maintenance

The slide-out tracks require no lubrication. The dark gray finish on the slides is a permanent lubrication.

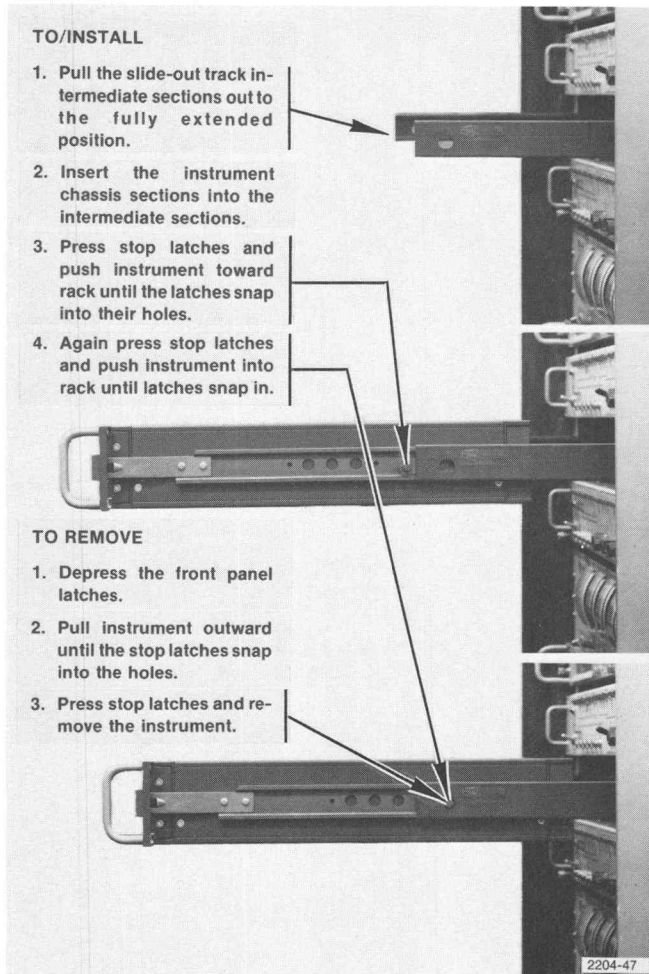


Fig. 5-15. Installing the 143 on the slide-out tracks.

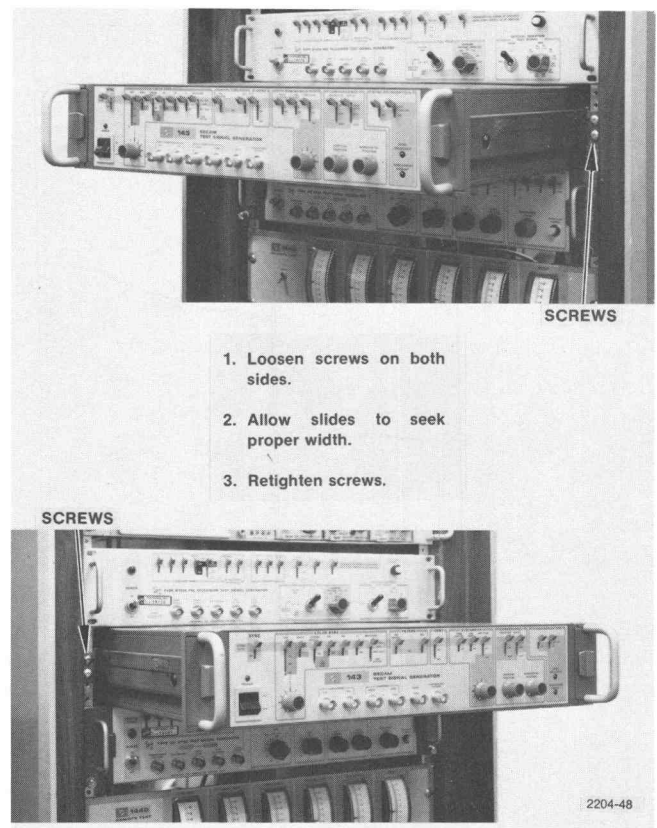


Fig. 5-16. Adjusting slides.

Section 6

PERFORMANCE CHECK AND ADJUSTMENT PROCEDURE

This section of the manual serves a dual purpose; first it allows the technician to evaluate the performance of the 143, and if not within specification it becomes the procedure to bring it back within specification. It may at times also serve as a tool for troubleshooting the 143. The checkout portion of this procedure should be performed after 1000 hours or 6 months of operation, or after a failure has been repaired. With the exception of the power supply adjustments, it is structured so that any single step can be accomplished without having to complete the entire procedure.

In the following procedure, steps that relate to Performance Check only are identified by the word "Check" in the step heading. Those steps that pertain to both the Performance Check and Adjustment procedures are headed "Check/Adjust". If a Performance Check only is to be performed, follow the steps titled "Check" plus the parts of the the combined "Check/Adjust" steps through all "CHECK" portions, skipping the "ADJUST" portions. If a complete Adjustment Procedure is to be performed, complete all parts of all steps, including the "Check" steps. This will assure that the instrument meets all Performance Requirements in the Specification section of this manual.

Equipment required to perform the optional steps at the end of this procedure is listed with those steps. Only additional equipment not already listed in the Test Equipment required list is included with the step.

Following the Test Equipment required list Table 6-1 lists all the calibration adjustments in this instrument. This list includes the adjustment's circuit number, name, and the calibration step number. The listing may serve as an index to the calibration procedure for partial calibration or trouble-shooting purposes.

Front-and rear-panel control and connector names on the 143 are fully capitalized in this procedure, for example CHROMA SEQUENCE. The 143 internal adjustment names have only the first letter of the name capitalized for example Blue Gain.

TEST EQUIPMENT

The test equipment listed here was used in preparing this procedure. The measurement capabilities described are the minimum required to verify instrument performance. Each piece of test equipment is assumed to be operating within its stated specifications. If alternative equipment is used, it must meet or exceed these requirements.

1. Digital Voltmeter. Accurate within 0.1% for dc volts from -15 to +15 V. Example: TEKTRONIX DM 501.

2. Levelled Sinewave Generator. Capable of amplitudes from 0.2 volt peak-to-peak to 4 volts peak-to-peak; frequency range from 50 kHz to 7 MHz. Example: TEKTRONIX SG 503.

3. Digital Counter. Accurate to 0.00005%. Example: TEKTRONIX DC 501, Opt. 1.

4. Power Module. For powering and housing TEKTRONIX DM 501, SG 503, and DC 501. (Required if using these units.) Example: TM 503.

5. Test Oscilloscope, to include the following characteristics:

Dual Time-Base. Range from 50 ns/div to 5 s/div with provisions for a delaying sweep and television triggering.

Dual-Trace Amplifier. Vertical amplifier with bandwidth of dc to 50 MHz; minimum deflection factor of 5 mV/div.

Example: TEKTRONIX 7603 with 7B53A Option 5 (Dual Time-Base), and 7A18 Dual-Trace Amplifier.

6. SECAM Signal Source. Can be either studio signal or from another 143.

Performance Check and Adjustment Procedure—143 SECAM

7. Spectrum Analyzer. Capable of measuring the third harmonic of the color subcarriers to -30 dB. Example: TEKTRONIX 7L12, or 7L13 (7000-Series Plug-in units), or a TEKTRONIX 1401A.

8. Deviation Meter. Accurate to within 1 kHz.

9. 75-ohm Cables (4)-42 inches long. Tektronix Part Number 012-0074-00.

10. 75-ohm End-Line Termination (2). Tektronix Part Number 011-0102-00.

11. 75-ohm Feed-Through Termination (2). Tektronix Part Number 011-0103-02.

12. P6101 1X Probe. Tektronix Part Number 010-6101-01.

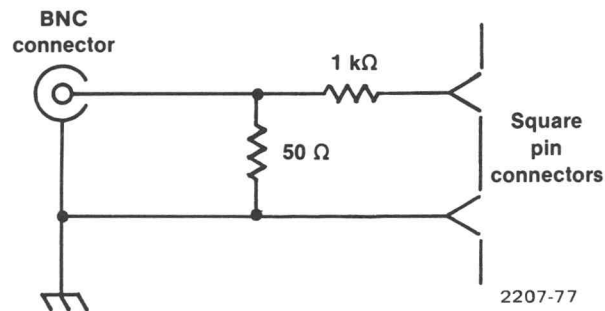
13. P6105 10X Probe. Tektronix Part Number 010-6105-01.

14. Variable Amplitude Calibrator. For use with TEKTRONIX 1481 or 1485 Waveform Monitors. Diagram and parts list are shown in Fig. 6-1.

15. Television Waveform Monitor. Capable of identifying the four SECAM fields. Example: TEKTRONIX 1481 or 1485 Opt. 8.

16. Color Television Picture Monitor. Capable of decoding SECAM. Example: TEKTRONIX 653A or 656A Monitors.

17. BNC female connector-to-square pin adaptor. Consists of a connector, short length of 75-ohm coaxial cable, a $1\text{ k}\Omega$ resistor, 50-ohm resistor, and two square-pin connectors. Item to be made up by user.



18. Voltage Control Unit. Capable of varying ac line voltage output between 198 Vac and 242 Vac. For example, General Radio W10MT3W Metered Variac Auto-transformer.

Each time the Variable Amplitude Calibrator, shown in Fig. 6-1, is used a simple calibration procedure must be followed.

Procedure

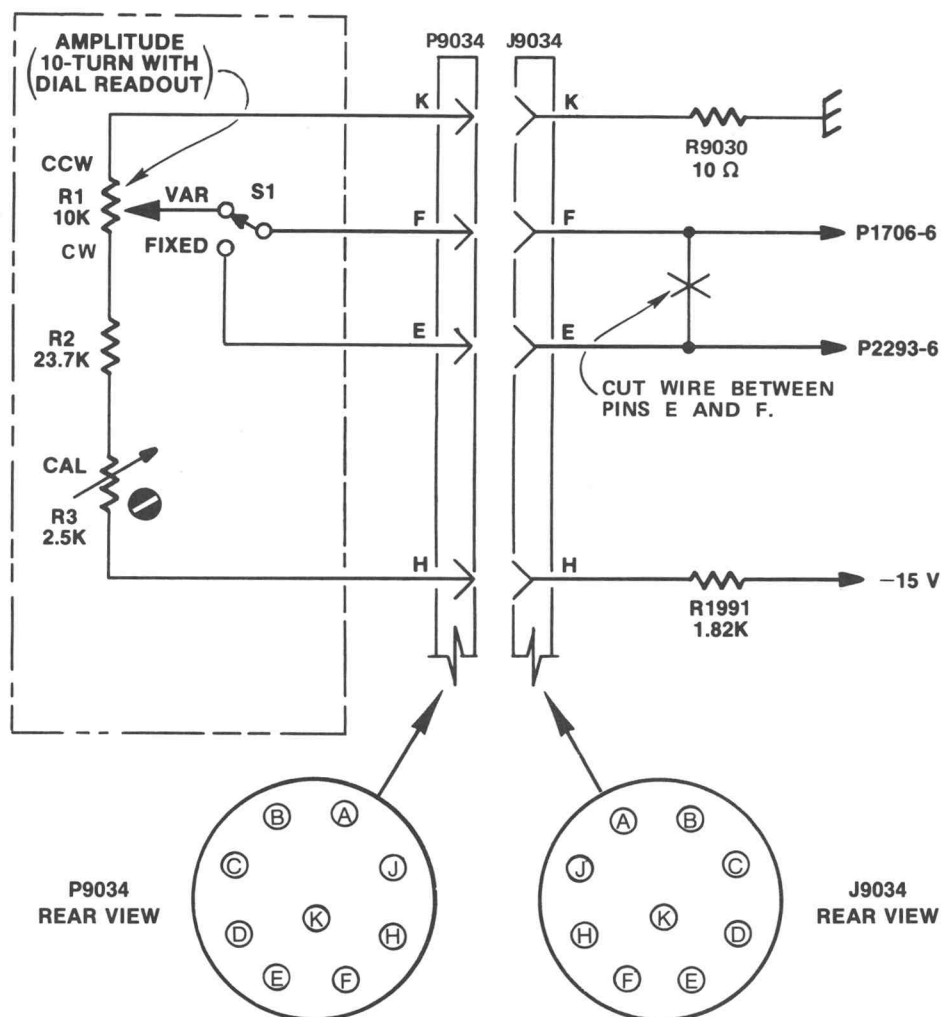
1. Set the Variable Amplitude Calibrator dial to 1.000.
2. Set the Variable Amplitude Fixed-Var switch to Fixed.
3. Set the 1480-Series DC Restorer to Sync Tip (1 V calibrator amplitude).
4. Switch the Fixed-Var switch back and forth and adjust the Variable Amplitude Calibrator Cal adjustment until no change in amplitude is noted between the two switch positions. Adjust the Cal adjustment only in the Var position of the Fixed-Var switch.

ADJUSTMENT LIST

The following alphabetical list of adjustments serves as an index to the Performance Check and Adjustment Procedure.

CALIBRATION FIXTURE

1480-SERIES REAR PANEL



Parts List

| Ckt No. | Description | Tektronix Part No. |
|---------|--|----------------------------|
| P9034 | 9-pin Amphenol #165-13 | 134-0049-00 |
| R1 | 10 k Ω \pm 5%, Ind. Lin. \pm 0.1%, 10-turn, prec. var. | 311-1729-00 |
| R2 | 23.7 k Ω \pm 1%, 1/8 W, metal film | 321-0325-00 |
| R3 | 2.5 k Ω \pm 20%, variable | 311-0086-00 |
| S1 | SPDT toggle switch 10-turn dial for R1, Kilo-dial Mod. 461-S-41 | 260-0613-00 331-0139-00 |
| Misc. | Approx. 3 ft. of 4-conductor cable and a small metal or plastic enclosure or case. | |

Set R1 fully counterclockwise (ccw) and the dial at 0 when installing the dial.

2329-04

Fig. 6-1. Variable Amplitude Calibrator used with 1480-Series waveform monitor.

Table 6-1

| Adjustment Name | Circuit Number | Procedure Step |
|---|-----------------------------|----------------|
| Bell Filter Bandwidth (Sync) | R554 | 10 |
| Bell Filter Center Frequency Adj (Sync) | L523 | 10 |
| Bell Filter Center Frequency | C1404 | 33 |
| Blanking Dc Level | R1425 | 31 |
| Blue Dc Level (RGB) | R751 | 45 |
| Blue Gain (RGB) | R731 | 45 |
| Blue Pulse Shaping (RGB) | L726-L746 | 45 |
| Chrominance Filter (Bandpass) | L1467-L1475- L1485-L1495 | 30 |
| Chrom/Lum Delay | R866 | 42 |
| Comparator Level (Subcarrier 2nd Harmonics) | R1351 | 32 |
| Composite Blanking Risettime | C590 | 43 |
| Composite Sync Risettime | C620 | 43 |
| Composite Sync Risettime (Front Panel) | C630 | 43 |
| Convergence Dc Level | R819 | 49 |
| Convergence Gain Adjust | R839 | 48 |
| Convergence Pulse Shaping | L797-L816 | 46 |
| Convergence 315 kHz Adj | R774 | 51 |
| Convergence 630 kHz Adj | R764 | 52 |
| Discriminator Bandwidth | R495 | 11 |
| Discriminator Center Frequency | L513 | 11 |
| D'B Adj | R1195 | 22 |
| D'R Adj | R1258 | 23 |
| Error Centering (Modulator Bal.) | R1284 | 21 |
| Error Tilt | R1270 | 20 |
| Field Drive Risettime | C610 | 43 |
| FM Demodulator Filter | L516-L496 | 12 |
| FoB Adjust | C208 | 6 |
| FoB Gain | L587 | 43 |
| FoR Adjust | C116 | 5 |
| FoR Centering | R105 | 5 |
| FoR Gain | L607 | 43 |

Table 6-1 (cont)

| Adjustment Name | Circuit Number | Procedure Step |
|--------------------------------|-----------------------|----------------|
| Green Dc Level (RGB) | R671 | 45 |
| Green Gain (RGB) | R652 | 45 |
| Green Pulse Shaping (RGB) | L646-L666 | 45 |
| Line Drive Risetime | C560 | 43 |
| Luminance Filter | L1562-L1564 | 27 |
| Output Amplifier Dc Adjust | R1554 | 29 |
| Pre-Emphasis Bandwidth | L1335-L1336- L1337 | 19 |
| Red Dc Level (RGB) | R711 | 45 |
| Red Gain (RGB) | R691 | 45 |
| Red Pulse Shaping (RGB) | L686-L706 | 45 |
| Sampling Pulse Delay | R153 | 7 |
| Sync Delay | R342 | 9 |
| Sync Filter | L1532-L1534 | 26 |
| Strobe Position | R457 | 13 |
| Subcarrier Amplitude | R1364 | 34 |
| Subcarrier Envelope Filter | L490-L520 | 10 |
| VCO Tune (Sync & Timing) | C299 | 8 |
| Video Gain | R1556 | 28 |
| −15 V Adj | R40 | 1 |
| +15 V Adj | R21 | 2 |
| +5 V Adj | R2 | 3 |
| 12.5 Hz Risetime | C570 | 43 |
| 7.8 kHz Risetime | C600 | 43 |
| 7.8 kHz Risetime (Front Panel) | C580 | 43 |

POWER SUPPLY

NOTE

If any of the power supply voltages are readjusted, it is necessary to check the entire calibration of the 143.

1. Check/Adjust −15 V Supply

a. Connect the digital voltmeter between the −15 V supply and ground. (The −15 V supply is on P40 of the Power Supply board, A1). See Fig. 6-2.

b. CHECK—for a meter reading of −15 V \pm 0.015 V.

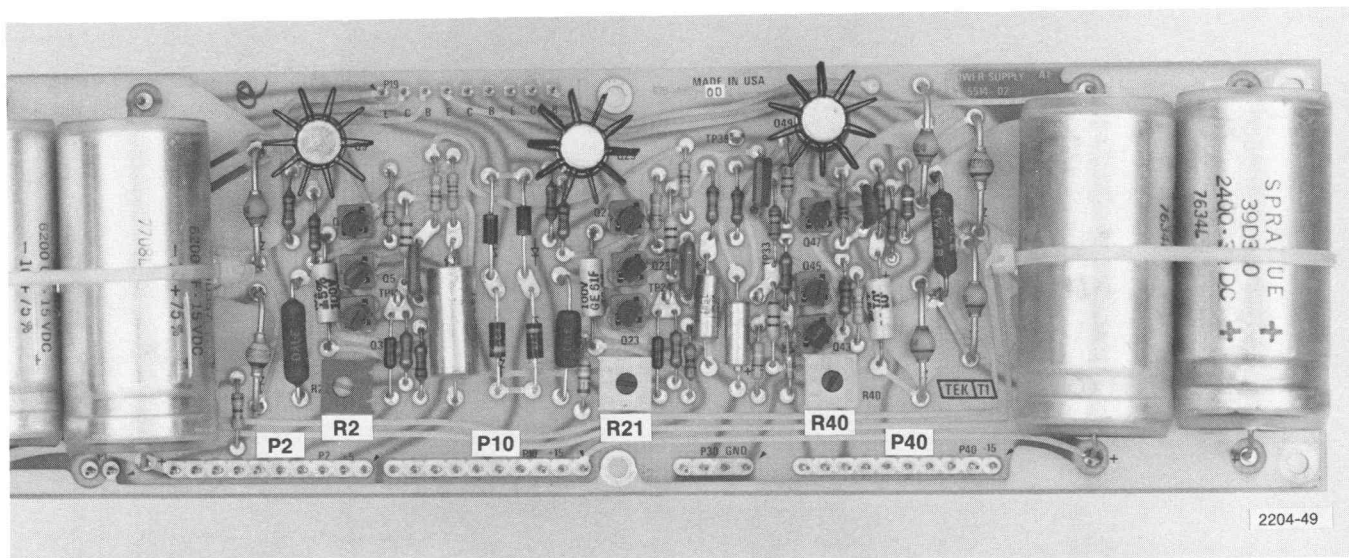


Fig. 6-2. Power Supply Circuit Board.

c. ADJUST—the -15 V Adjust, R40, for -15.000 V ($\pm 0.015\text{ V}$).

2. Check/Adjust $+15\text{ V}$ Supply

a. Connect the digital voltmeter between the $+15\text{ V}$ supply and ground. (The $+15\text{ V}$ supply is on P10 of the Power Supply board, A1. See Fig. 6-2.

b. CHECK—for a meter reading of $+15\text{ V} \pm 0.015\text{ V}$.

c. ADJUST—the $+15\text{ V}$ Adjust, R21, for $+15.000\text{ V}$ ($\pm 0.015\text{ V}$).

3. Check/Adjust $+5\text{ V}$ Supply

a. Connect the digital voltmeter between the $+5\text{ V}$ supply and ground. (The $+5\text{ V}$ supply is on P2 of the Power Supply board, A1). See Fig. 6-2.

b. CHECK—for a meter reading of $+5\text{ V} \pm 0.05\text{ V}$.

c. ADJUST—the $+5\text{ V}$ Adjust, R2, for $+5.000\text{ V}$ ($\pm 0.05\text{ V}$).

4. Check Power Supply Ripple & Regulation

a. Connect the variable line-voltage control unit to an ac outlet. Connect the 143 ac power cord to the output of the voltage control unit, and set the 143 POWER switch to ON. Set the voltage control unit output to 220 Vac (or whichever center line-voltage the instrument is wired for).

b. Connect an X1 probe from the test oscilloscope to each of the power supplies, in turn, checking ripple and regulation while varying the line voltage $\pm 10\%$ from the selected center line voltage (i.e., $220\text{ Vac} \pm 10\%$, or 198 Vac to 242 Vac). Use Table 6-2 for tolerances.

Table 6-2

| Supply | Maximum Ripple | Voltage Tolerance |
|----------------|----------------|-------------------|
| -15 V | 10 mV | 0.1% (0.015 V) |
| $+5\text{ V}$ | 10 mV | 1.0% (0.05 V) |
| $+15\text{ V}$ | 10 mV | 0.1% (0.015 V) |

REFERENCE OSCILLATOR

5. Check/Adjust FoR

a. Connect the test oscilloscope probe to TP105. See Fig. 6-3.

b. Set the test oscilloscope for a dc-coupled input.

c. CHECK—for a dc level of about 3 V .

d. ADJUST—FoR Centering, R105, (Fig. 6-3) for a dc level of $+3\text{ V}$.

e. Connect the digital counter input to the 143 FoR SUBCARRIER output.

Performance Check and Adjustment Procedure—143 SECAM

f. CHECK—for 4.406250 MHz, ± 4 Hz.

g. ADJUST—the FoR Adjust, C116, (Fig. 6-3) for a reading of 4.406250 MHz (± 4 Hz).

6. Check/Adjust FoB Lock

a. Connect the test oscilloscope probe to TP229 (Fig. 6-3).

b. CHECK—for a voltage level between +1 V and +5 V.

c. Connect the test oscilloscope probe to TP1075, located on the Modulator circuit board, Fig. 6-12.

d. ADJUST—the FoB Adjust, C208, (Fig. 6-3) for minimum display jitter.

e. Reconnect the test oscilloscope probe to TP229 and recheck for a voltage level between 1 and 5 V. (If amplitude is less than 1 V or greater than 5 V, repeat parts c and d of this step.)

f. Connect the digital counter input to the 143 FoB SUBCARRIER output.

g. CHECK—for 4.250000 MHz ± 4 Hz.

7. Check/Adjust External Sync to Internal Subcarrier Reference

a. Connect the SECAM signal to the 143 COMPOSITE VIDEO LOOP-THRU INPUT. Terminate the other side of the input in 75 ohms.

b. Connect the 143 COMPOSITE SYNC OUTPUT to the test oscilloscope external trigger input.

c. Connect the test oscilloscope to TP161 (Fig. 6-3).

d. Trigger test oscilloscope externally from the 143 COMPOSITE SYNC.

e. CHECK—for no change in timing when changing the SYNCHRONIZATION switch between EXT and INT.

f. ADJUST—Sampling Pulse Delay, R153, (Fig. 6-3) for no change in timing when the SYNCHRONIZATION switch is changed from EXT to INT.

(Switch must remain in EXT for a minimum of 10 seconds before changing to INT and adjusting.)

SYNC & TIMING

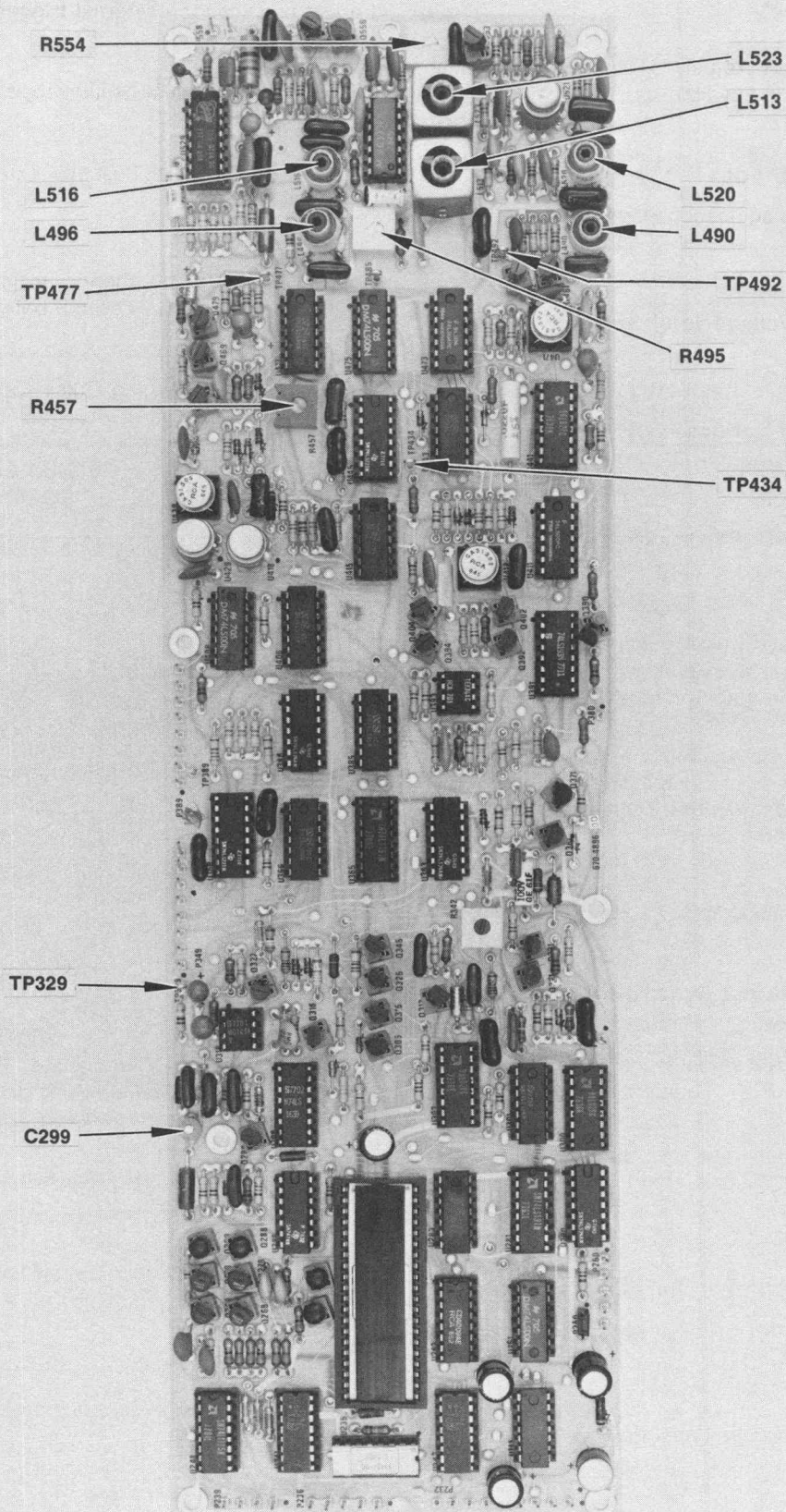
8. Check/Adjust 10 MHz Oscillator

a. Trigger the test oscilloscope from the 143 COMPOSITE SYNC.

b. Connect the test oscilloscope probe to TP329, (Fig. 6-4).

c. CHECK—for a signal amplitude of 7.5 V ± 0.75 V.

d. ADJUST—VCO Tune, C299, (Fig. 6-4) for a dc level of 7.5 V (± 0.75 V). There will be no large line-rate level jumps when C299 is properly adjusted.



2204-51

Fig. 6-4. Sync & Timing Circuit Board.

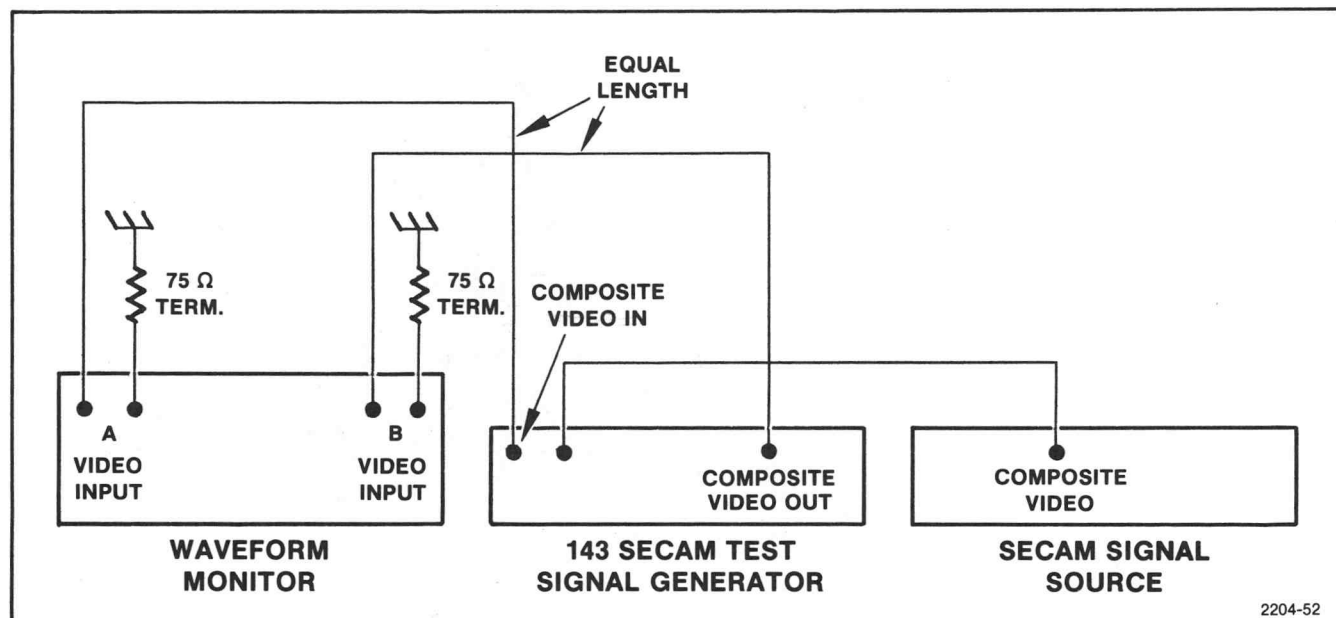


Fig. 6-5. Connections for Sync Delay check.

9. Check/Adjust Sync Delay

a. Connect the SECAM signal source and waveform monitor as shown in Fig. 6-5. Note that signal cables from the Loop-thru connector and the COMPOSITE VIDEO OUTPUT must be the same length.

b. Set the waveform monitor display to 10 $\mu\text{s}/\text{div}$, magnifier to X5, and input to A-B.

c. CHECK—for aberrations of equal duration on either side of the sync pulse. See Fig. 6-6.

d. ADJUST—Sync Delay, R342, for equal aberration both sides of the sync pulse. See Fig. 6-6.

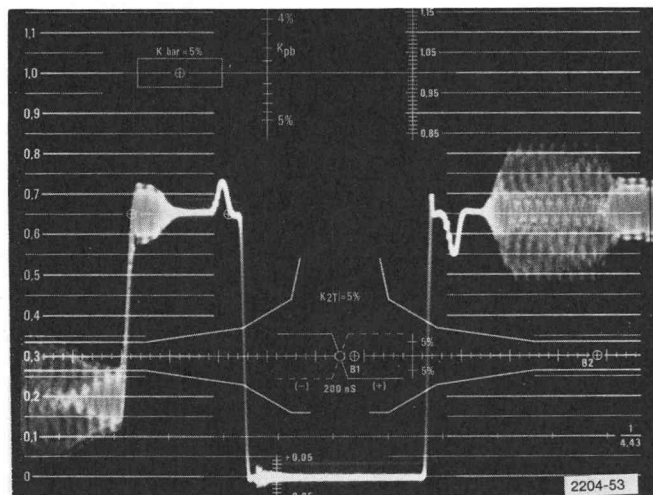


Fig. 6-6. Sync Delay Measurement.

10. Check/Adjust Discriminator-Limiter Bell Filter

a. Externally trigger the test oscilloscope from the 143 COMPOSITE SYNC OUTPUT.

b. Connect the test oscilloscope probe to TP492, (Fig. 6-4).

c. CHECK—for a flat display, similar to Fig. 6-7.

d. ADJUST—Bell Filter Center Frequency, L523, and Bell Filter Bandwidth, R554, for the flattest display possible.

e. CHECK—for transient response similar to that in to Fig. 6-8.

f. ADJUST—L490 and L520, Subcarrier Envelope Filter, (Fig. 6-4) for the best transient response.

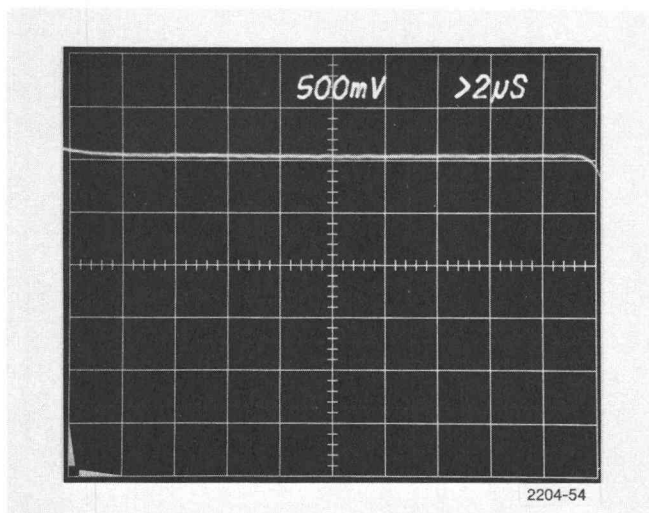


Fig. 6-7. Bell Filter Adjustment flat display.

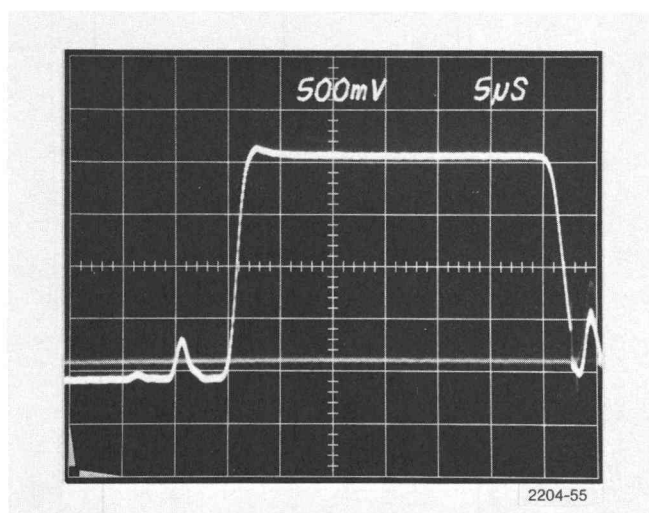


Fig. 6-8. Transient Response check for Bell Filter.

11. Check/Adjust Discriminator

a. Externally trigger the test oscilloscope from the 143 COMPOSITE SYNC OUTPUT.

b. Connect the test oscilloscope probe to TP477, (Fig. 6-4).

c. ADJUST—Discriminator Center Frequency, L513, (Fig. 6-4) for the maximum demodulated output.

d. CHECK—for 1 V difference in the white levels of two adjacent lines. See Fig. 6-9.

e. ADJUST—Discriminator Bandwidth, R495, (Fig. 6-4) for a 1 V difference in the white levels.

f. Change the test oscilloscope triggering to display field ID pulses (bottles).

g. CHECK—for symmetrical pulses.

h. ADJUST—L513 for best pulse symmetry.

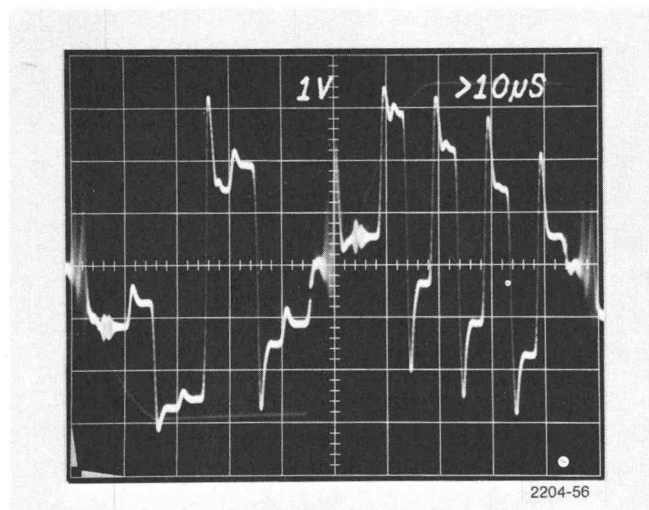


Fig. 6-9. White Levels on 2 adjacent lines.

12. Adjust FM Demodulator Filter

a. Externally trigger the test oscilloscope from the 143 COMPOSITE SYNC OUTPUT.

b. Set the 143 PRE-EMPHASIS switch to OFF.

c. Connect the test oscilloscope probe to TP477, (Fig. 6-4).

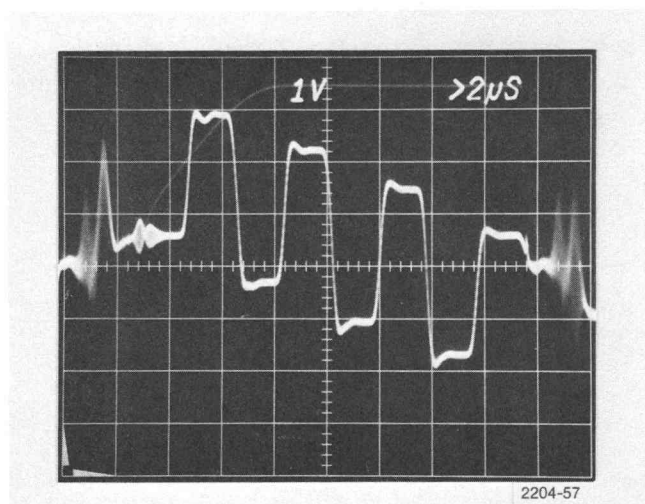


Fig. 6-10. FM Demodulator Transient Response.

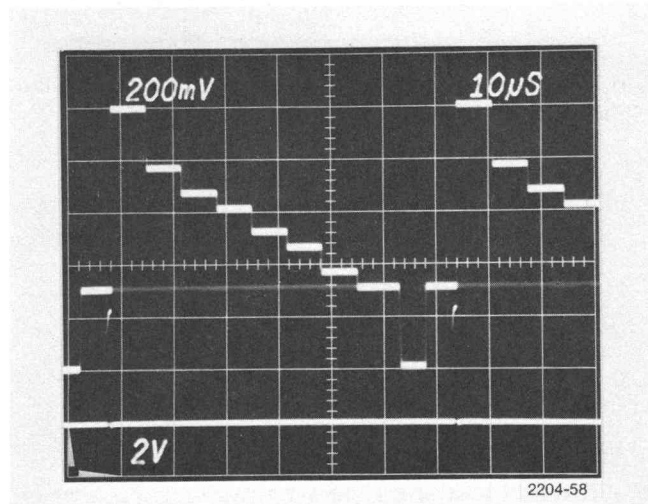


Fig. 6-11. Strobe Timing.

d. CHECK—for transient response similar to that shown in Fig. 6-10.

e. ADJUST—L516 and L496, FM Demodulator Filter, (Fig. 6-4) for best transient response.

13. Check/Adjust Strobe Timing

a. Externally trigger the test oscilloscope with 143 COMPOSITE SYNC.

b. Connect the test oscilloscope probe to TP434, (Fig. 6-4).

c. Connect the 143 COMPOSITE VIDEO OUTPUT to the other vertical input of the test oscilloscope. Terminate the 143 output in 75 ohms.

d. Set the test oscilloscope vertical input mode to alternate.

e. Set the 143 SUBCARRIER AMPLITUDE switch to OFF.

f. CHECK—for a strobe just prior to the trailing edge of blanking. See Fig. 6-11.

g. ADJUST—Strobe Position, R457, (Fig. 6-4) for a strobe just before the trailing edge of blanking.

14. Check Gen Lock Sync

a. Place a variable resistor in the lead from the SECAM signal to the 143 COMPOSITE VIDEO INPUT.

b. CHECK—that the 143 remains locked to the SECAM sync source while varying the input amplitude from 95 mV to 950 mV (sync to peak white).

c. Turn off the SECAM signal source's Sync.

d. CHECK—that the 143's SYNC MISSING indicator lights.

15. Check Subcarrier Lock

a. Vary the SUBCARRIER amplitude of the SECAM signal source.

b. CHECK—that the 143 remains locked to the SECAM signal source when the D'B unmodulated subcarrier amplitude varies between 21 and 334 mV.

16. Check Chroma Sequence

a. Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.

b. Place the 143 SYNCHRONIZATION switch in the LINE position.

- c. Reverse the SECAM source CHROMA SEQUENCE.
- d. CHECK—for an almost instantaneous change in the 143's color sequence.
- e. Change the SYNCHRONIZATION switch to FIELD.
- f. Reverse the SECAM source CHROMA SEQUENCE.
- g. CHECK—that the 143 color sequence changes within 300 ms.

17. Check Field and Line Gen Lock

- a. Set the SYNCHRONIZATION switch to FIELD.
- b. Turn off the SECAM source Field Identification signals.
- c. CHECK—that the 143 SUBCARRIER ABSENT indicator lights.
- d. Turn on the SECAM source Field Identification pulses.
- e. CHECK—that the SUBCARRIER ABSENT indicator is off.
- f. Set the 143 SYNCHRONIZATION switch to LINE.

- g. Turn off the SECAM source Line Burst.

- h. CHECK—that the SUBCARRIER ABSENT indicator again lights.

18. Check Sync Jitter (Gen Lock)

- a. Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.

- b. Connect the SECAM signal source to the 143 COMPOSITE VIDEO INPUT. Terminate the other loop-thru input in 75 ohms. Set the 143 SYNCHRONIZATION switch to LINE.

- c. Set the waveform monitor for a two-line display (5 μ s/div). Set the waveform monitor for AFC sync mode of operation.

- d. Set the waveform monitor magnifier to X50 (100 ns/div).

- e. Set the waveform monitor volts full scale to 0.5.

- f. Position the leading edge of the sync pulse onto the graticule.

- g. CHECK—the trailing edge of the sync pulse for 5 ns or less jitter (0.25 minor division).

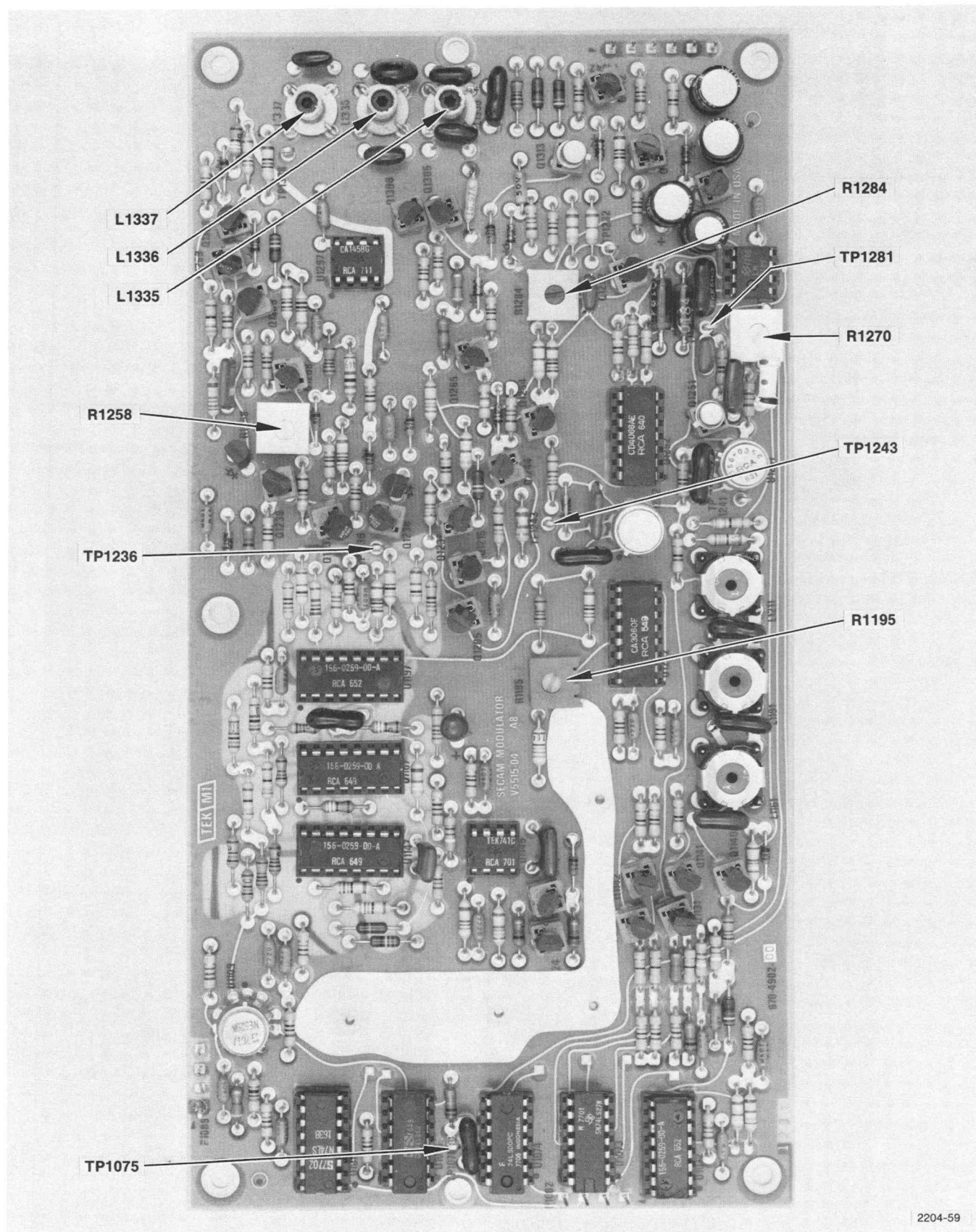


Fig. 6-12. Modulator Circuit Board.

MODULATOR

19. Check/Adjust Modulator Transient Response

a. Connect the test oscilloscope probe to TP1236, (Fig. 6-12).

b. Connect the 143 COMPOSITE SYNC to the test oscilloscope external trigger input and externally trigger the test oscilloscope.

c. Set the 143 PRE-EMPHASIS switch to OFF.

d. CHECK—the test oscilloscope display for square corners to the transitions, free of excessive overshoot or rounding.

e. ADJUST—Pre-Emphasis Bandwidth, L1335, L1336, and L1337, (Fig. 6-12) for optimum transient response (square corners on the transitions).

20. Check/Adjust Tilt

a. Connect the test oscilloscope probe to TP1075, on the Modulator board (see Fig. 6-12).

b. Set the D'B, D'R, and PRE-EMPHASIS switches to OFF.

c. Set the test oscilloscope to view 2 lines, with the vertical sensitivity set at 50 mV/div.

d. CHECK—for a flat waveform.

e. ADJUST Error Tilt, R1270, (Fig. 6-12) for the flattest waveform.

(See step 6 (b, c, & d) if the display exhibits vertical jitter.)

21. Check/Adjust Modulator Balance

a. Connect the test oscilloscope probe to TP1281 on the Modulator board, see Fig. 6-12.

b. Turn on 143 D'B and D'R. Set the PRE-EMPHASIS switch to OFF.

c. CHECK—that the waveform is a straight horizontal line.

d. ADJUST—Error Centering, R1284, (Fig. 6-12) to balance the waveform.

22. Check/Adjust D'B Field Identification Frequency

a. Connect the 143 COMPOSITE VIDEO OUTPUT to the deviation meter.

b. Set the PRE-EMPHASIS switch to OFF.

c. CHECK—that the D'B Field Identification signal frequency is at 3.900 MHz \pm 5.5 kHz.

d. ADJUST—D'B Adj. R1195, (Fig. 6-12) on the Modulator board for a D'B Field Identification signal frequency of 3.9000 MHz \pm 5.5 kHz.

23. Check/Adjust D'R Field Identification Frequency

a. Connect the 143 COMPOSITE VIDEO OUTPUT to the deviation meter.

b. CHECK—that the D'R Field Identification signal frequency is at 4.7563 kHz \pm 5.5 kHz.

c. ADJUST—D'R Adj. R1258, (Fig. 6-12) on the Modulator board for a D'R Field Identification signal frequency of 4.7563 MHz \pm 5.5 kHz.

d. Repeat steps 21, 22, and 23 until interaction is minimized.

24. Check Color Frequencies

a. Connect the 143 COMPOSITE VIDEO OUTPUT to the deviation meter.

b. Set the PRE-EMPHASIS switch to OFF.

c. Measure the deviation of each color bar for 75%, 25%, and 100% amplitudes.

d. CHECK—that specifications listed in Table 6-3 are met.

Table 6-3
COLOR FREQUENCIES

| Ampl. | Color | D'B Frequency | D'R Frequency |
|-------|---------|--------------------------|--------------------------|
| 75% | White | 4.2500 MHz \pm 1.0 kHz | 4.4063 MHz \pm 1.0 kHz |
| | Yellow | 4.0200 MHz \pm 4.0 kHz | 4.3607 MHz \pm 1.6 kHz |
| | Cyan | 4.3276 MHz \pm 2.0 kHz | 4.6863 MHz \pm 4.6 kHz |
| | Green | 4.0976 MHz \pm 3.0 kHz | 4.6407 MHz \pm 4.0 kHz |
| | Magenta | 4.4024 MHz \pm 3.0 kHz | 4.1718 MHz \pm 4.0 kHz |
| | Red | 4.1724 MHz \pm 2.0 kHz | 4.1263 MHz \pm 4.6 kHz |
| | Blue | 4.4800 MHz \pm 4.0 kHz | 4.4518 MHz \pm 1.6 kHz |
| 25% | White | 4.2500 MHz \pm 1.0 kHz | 4.4063 MHz \pm 1.0 kHz |
| | Yellow | 4.1733 MHz \pm 2.0 kHz | 4.3911 MHz \pm 1.2 kHz |
| | Cyan | 4.2759 MHz \pm 1.3 kHz | 4.4997 MHz \pm 2.2 kHz |
| | Green | 4.1992 MHz \pm 1.6 kHz | 4.4845 MHz \pm 2.0 kHz |
| | Magenta | 4.3008 MHz \pm 1.6 kHz | 4.3282 MHz \pm 2.0 kHz |
| | Red | 4.2241 MHz \pm 1.3 kHz | 4.3130 MHz \pm 2.2 kHz |
| | Blue | 4.3267 MHz \pm 2.0 kHz | 4.4215 MHz \pm 1.2 kHz |
| 100% | White | 4.2500 MHz \pm 1.0 kHz | 4.4063 MHz \pm 1.0 kHz |
| | Yellow | 3.9433 MHz \pm 5.0 kHz | 4.3455 MHz \pm 1.8 kHz |
| | Cyan | 4.3535 MHz \pm 2.3 kHz | 4.7563 MHz \pm 5.5 kHz |
| | Green | 4.0468 MHz \pm 3.6 kHz | 4.7189 MHz \pm 5.0 kHz |
| | Magenta | 4.4532 MHz \pm 3.6 kHz | 4.0936 MHz \pm 5.0 kHz |
| | Red | 4.1465 MHz \pm 2.3 kHz | 4.0329 MHz \pm 5.8 kHz |
| | Blue | 4.5567 MHz \pm 5.0 kHz | 4.4670 MHz \pm 1.8 kHz |

25. Check ALL LINES SAME logic

a. Connect the test oscilloscope probe to TP1243 on the Modulator board. See Fig. 6-12.

b. Set all front-panel switches in the NORMAL SIGNAL position.

c. Change the CHROMA SEQUENCE switch to ALL LINES SAME.

d. CHECK—for an error voltage of approximately 5 V, with slight offset at field rate. See Fig. 6-13.

e. Change the D'B switch to OFF.

f. CHECK—that the error voltage has no field rate offset, but rather remains at a constant level, near 5 V.

g. Return the D'B switch to the NORMAL SIGNAL position and change the D'R switch to OFF.

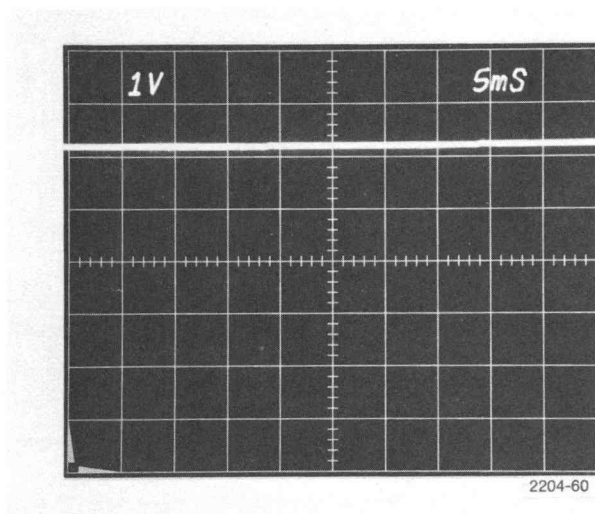


Fig. 6-13. All lines same switching.

h. CHECK—the error voltage, as described in part f of this step.

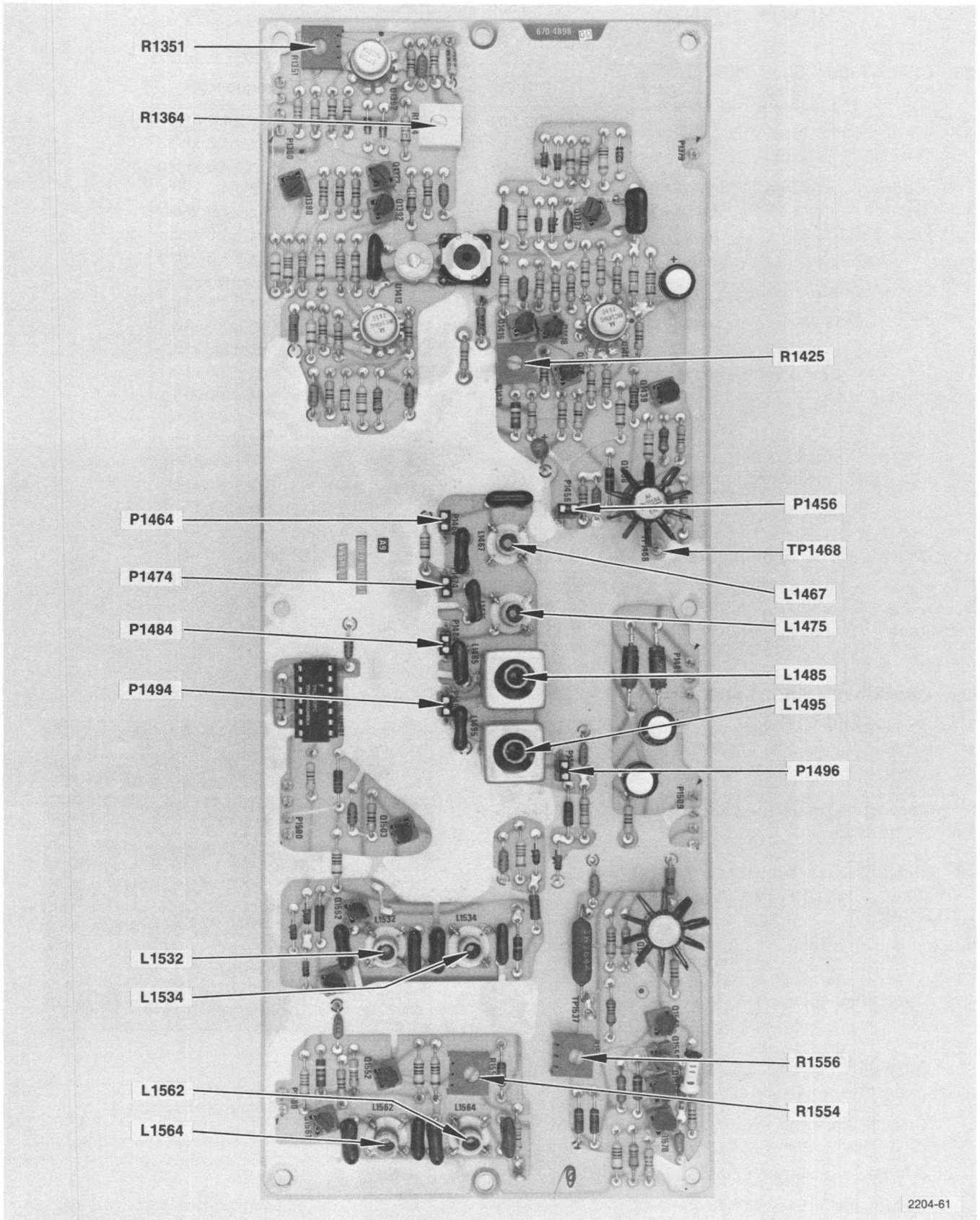


Fig. 6-14. VIDEO Output Circuit Board.

VIDEO OUTPUT

26. Check/Adjust Sync Pulse Transition

- a. Set the 143 SUBCARRIER AMPLITUDE switch to OFF.
- b. Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.
- c. Set the waveform monitor for a 2 line display, and set the magnifier to X25.
- d. CHECK—for the transient response close to that shown in Fig. 6-15.
- e. ADJUST—the Sync Filter, L1532 and L1534 (Fig. 6-14) for the best transient response.

27. Check/Adjust Luminance Transition

- a. Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.
- b. CHECK—that the falltime of the luminance steps is 100 ns, ± 10 ns. See Fig. 6-16.
- c. ADJUST—the Luminance Filter, L1562 and L1564 (Fig. 6-14) for the best luminance transitions.

28. Check/Adjust Output Luminance Amplitude

- a. Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.
- b. Set the 143 AMPLITUDE switch to 100%.
- c. Connect the Variable Amplitude Calibrator (Calibration Fixture) to the 1480-Series J9034 (on the rear panel).
- d. Set the Variable Amplitude Calibrator dial to 7.00.
- e. Press both the 1480-Series Cal and Oper pushbuttons.

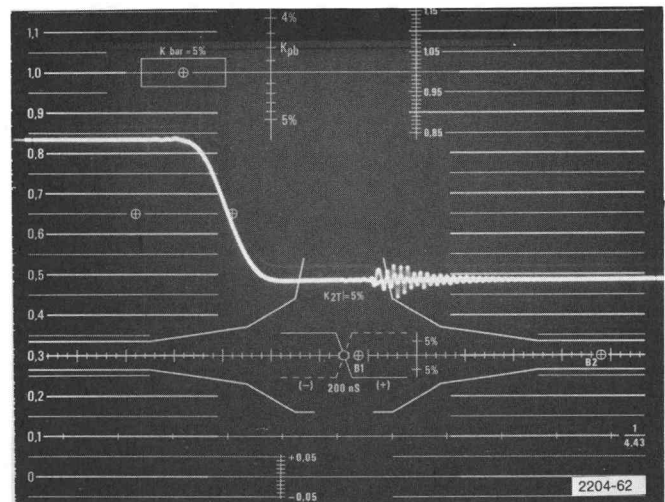


Fig. 6-15. Sync Pulse transition.

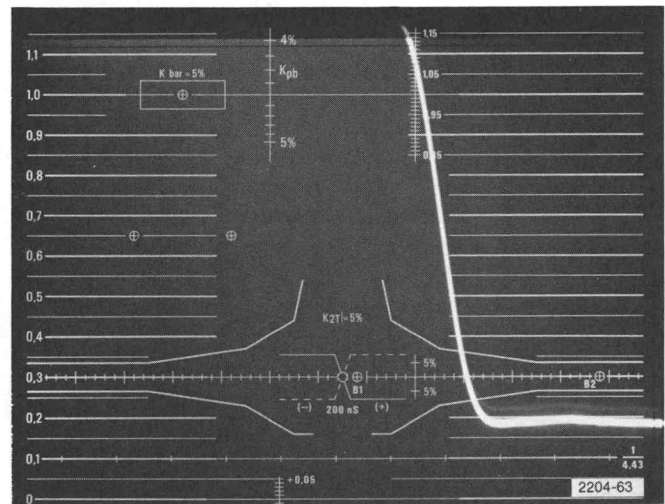


Fig. 6-16. Fall time of luminance steps.

- f. CHECK—that the peak white level and the blanking level are overlaid within ± 7 mV. See Fig. 6-17.
- g. ADJUST—Video Gain, R1556 (Fig. 6-14), so that the luminance level is overlaid with the blanking level (700 mV).

29. Check/Adjust Blanking Level

- a. Set the waveform monitor input for dc-coupling, the dc restorer to off, and set the vertical position control so that the trace overlays the graticule blanking level line.
- b. Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.

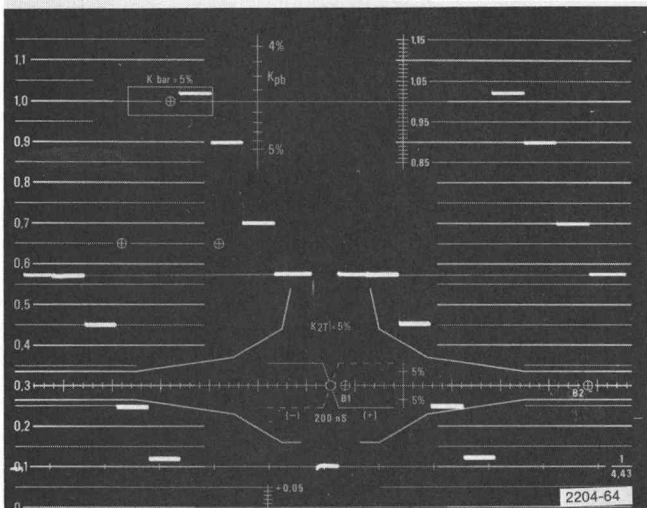


Fig. 6-17. Luminance Amplitude.

c. CHECK—that the blanking level overlays the graticule blanking level line.

d. ADJUST—DC Adj, R1554, until blanking level overlays graticule blanking level line.

30. Adjust Chrominance Filter

(Need not be performed unless component changes have been made, or strong reason exists to suspect misalignment.)

- Set the 143 POWER switch to OFF.
- Remove the following plug jumpers, see Fig. 6-14.

P1456
P1464
P1474
P1484
P1494
P1496

c. Connect the special adaptor cable (Item 17) to P1456, signal to pin 2, shield to pin 3.

d. Connect the leveled sinewave generator output to the adaptor cable.

e. Set the leveled sinewave generator frequency to 3.78 MHz.

f. Connect the test oscilloscope probe to pin 2 of P1456 and ground to pin 3.

g. ADJUST—L1467 for minimum test oscilloscope trace amplitude.

h. ADJUST—the other three variable inductors, L1475, L1485, and L1495, in the same manner, using the connections and frequencies listed in Table 6-4.

Table 6-4

CHROMINANCE FILTER ADJUSTMENT

| Connect Signal and Probe to | Terminal Gnd. | Frequency | Adjust |
|-----------------------------|---------------|-----------|--------|
| P1456-2 | P1456-3 | 3.78 MHz | L1467 |
| P1484-2 | P1484-1 | 5.21 MHz | L1475 |
| P1494-2 | P1494-1 | 3.28 MHz | L1485 |
| P1496-2 | P1496-1 | 5.10 MHz | L1495 |

- Reposition the plug-jumpers according to Table 6-5.

Table 6-5

PLUG-JUMPER SETTINGS

| Plug Number | Pins |
|-------------|-------|
| P1456 | 1 & 2 |
| P1464 | 1 & 2 |
| P1474 | 2 & 3 |
| P1484 | 2 & 3 |
| P1494 | 2 & 3 |
| P1496 | 2 & 3 |

31. Adjust Color Blanking Dc Level

a. Set the 143 POWER switch to ON. Set the SUB-CARRIER AMPLITUDE switch to OFF.

b. Connect the test oscilloscope probe to TP1468 (see Fig. 6-14).

c. ADJUST—Blanking Dc Level, R1425, for minimum pulse amplitude at the beginning and end of subcarrier blanking.

32. Adjust Subcarrier 2nd Harmonics

- Connect the 143 COMPOSITE VIDEO OUTPUT to the spectrum analyzer signal input.
- Set all 143 front-panel switches, except LUMINANCE, to the NORMAL SIGNAL position. Set LUMINANCE and SYNC switches to OFF.
- ADJUST—Comparator Level, R1351 (see Fig. 6-14), for minimum 2nd harmonics (7.8 MHz to 9.5 MHz).

33. Check/Adjust Anti-Bell Filter

- Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.
- Set all 143 front-panel switches to the NORMAL SIGNAL position. Set the Y and PRE-EMPHASIS FILTER switches to OFF.
- CHECK—the display for equal amplitudes of subcarrier for the red and blue color bars on the D'R line & equal amplitudes for the red and magenta color bars on the D'B line. See Fig. 6-18.
- ADJUST—the Bell Filter Center Frequency, C1404, for equal amplitudes of subcarrier for the red and blue (D'R) and red and magenta (D'B) color bars. It may be necessary to compromise for the closest match on both lines.

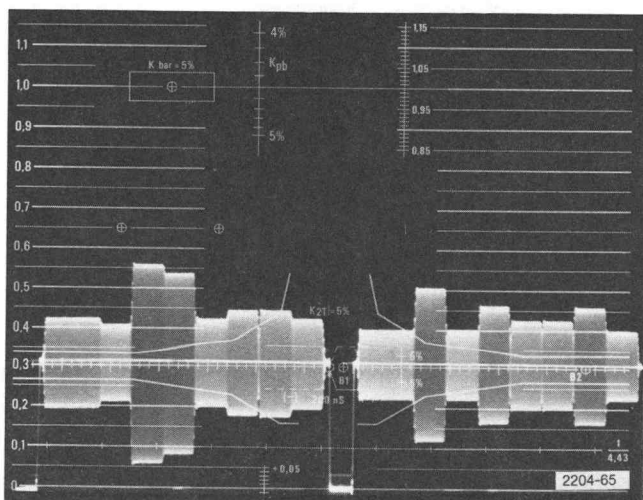


Fig. 6-18. Color Bar amplitude.

34. Check/Adjust D'B Reference Subcarrier

- Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.
- Connect the Variable Amplitude Calibrator to the 1480-Series J9034 (on the rear panel).
- Set the Variable Amplitude Calibrator output to 1.67.
- Set all 143 front-panel switches to the NORMAL SIGNAL position, except LUMINANCE AMP and D'B to OFF.
- Set the 1480-Series Display to 10 μ s/Div, Volts Full Scale of 0.2, and press both the Oper and Cal pushbuttons.
- CHECK—the D'B reference subcarrier amplitude for 167 mV \pm 16.7 mV.
- ADJUST—Subcarrier Amplitude, R1364, for 167 mV \pm 16.7 mV of D'B subcarrier.

h. Steps 33 and 34 interact; repeat until requirements of both steps are met.

35. Check Sync Switch

- Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.
- Set the waveform monitor to view 2 fields.
- Set all 143 front-panel switches to the NORMAL SIGNAL POSITION.
- Observe a normal color bar signal.
- Change the SYNC switch to OFF.
- CHECK—for no line or field sync on the composite video waveform.

36. Check Variable Subcarrier

- a. Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.
- b. Set the waveform monitor to display 2 lines.
- c. Set all 143 front-panel switches to the NORMAL SIGNAL position.
- d. Set the 143 SUBCARRIER AMPLITUDE switch to VAR.
- e. Turn the VAR SUBCARRIER AMPLITUDE control clockwise.
- f. CHECK—for approximately double chrominance amplitude.
- g. CHECK—for no visible chrominance with the control fully counterclockwise.

COLOR BAR LOGIC**37. Check Front-Panel Chrominance Logic Switching**

- a. Connect the 143, waveform monitor, and picture monitor as shown in Fig. 6-19.
- b. Connect the test oscilloscope probe to TP881. Set the vertical input to dc-coupling.
- c. Set all 143 front-panel switches in the NORMAL SIGNAL position.
- d. Set the waveform monitor to display 2 lines (10 μ s/div).
- e. CHECK—the front-panel chrominance logic switching according to Table 6-6. An N in a column indicates that the switch is in the NORMAL SIGNAL position, an X denotes the switches OFF position. Other positions will be spelled out. The column headed TP881 has a 0 for logic low and a 1 for logic high.

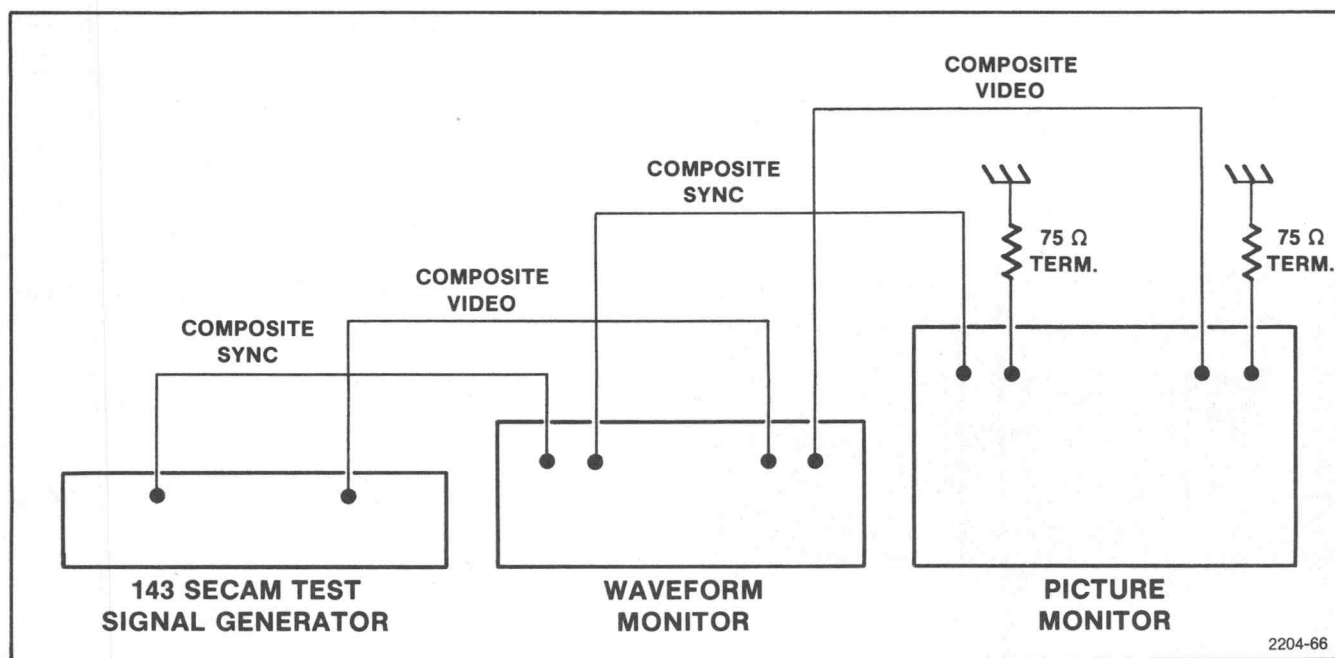


Fig. 6-19. Connections for test equipment.

Table 6-6
CHROMINANCE LOGIC SWITCHING

| CHROMA SEQUENCE | D'R | D'B | IDENT | TP881 Level | Display |
|----------------------------|------------|------------|--------------|------------------------|--|
| N N | N N | N N | N REV | 1 1 | Normal Color Bars Normal Color Bars (Bottles Reversed) |
| N N | N N | X X | N REV | 1 1 | No D'B Modulation No D'B Modulation (Bottles Reversed) |
| N N | X X | N N | N REV | 1 1 | No D'R Modulation No D'R Modulation (Bottles Reversed) |
| N N | X X | X X | N REV | 1 1 | No Subcarrier Modulation No Subcarrier Modulation (Bottles Reversed) |
| REV REV | N N | N N | N REV | 1 1 | Chroma Sequence Reversed Chroma Sequence Reversed (Bottles Reversed) |
| REV REV | N N | X X | N REV | 1 1 | No D'B Modulation No D'B Modulation (Bottles Reversed) |
| REV REV | X X | N N | N REV | 1 1 | No D'R Modulation No D'R Modulation (Bottles Reversed) |
| REV REV | X X | X X | N REV | 1 1 | No Subcarrier Modulation No Subcarrier Modulation (Bottles Reversed) |
| ALL LINES SAME | N N | N N | N REV | 1 1 | Normal Color Bars Normal Color Bars (Bottles Reversed) |
| | N N | X X | N REV | 0 0 | All Lines D'R All Lines D'R (Bottles Reversed) |
| | X X | N N | N REV | 0 0 | All Lines D'B All Lines D'B (Bottles Reversed) |
| ALL LINES SAME | X X | X X | N REV | 1 1 | No Subcarrier Modulation No Subcarrier Modulation (Bottles Reversed) |

f. Return all switches to the NORMAL SIGNAL position.

38. Check Filter Operation

a. Connect the 143 COMPOSITE VIDEO output to the waveform monitor input. Terminate the other loop-thru input in 75 ohms. Set the 143 Y (luminance) switch to OFF.

b. Set the 143 PRE-EMPHASIS FILTER to OFF.

c. CHECK—that the display loses the overshoot at transitions. See Fig. 6-20.

d. Return all switches to the NORMAL SIGNAL position.

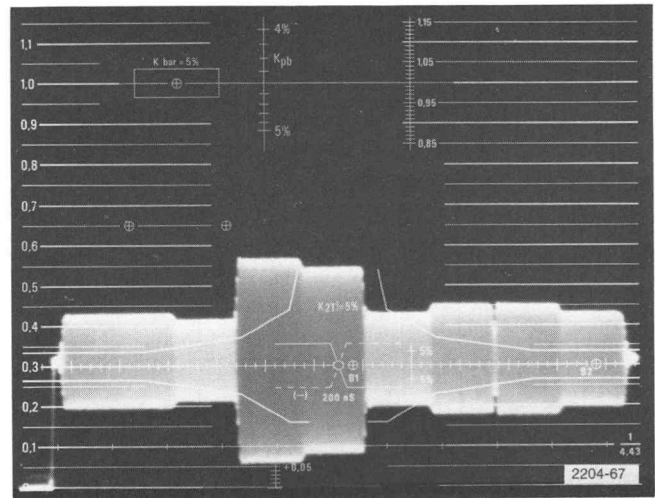


Fig. 6-20. Color Bar signal with no Pre-emphasis.

39. Check Test Pattern Programming

a. Connect the 143 COMPOSITE VIDEO OUTPUT to the picture monitor input. Terminate the other loop-thru input in 75 ohms.

b. Change P866 and P876 to the 1 position, Reverse Color Bars. Position 1 is with the jumper between plug pins 1 and 2, position 2 is with the jumper between pins 2 and 3. See Fig. 6-21 for plug and jumper locations.

c. Change the front-panel WAVEFORM switch to SPLIT FIELD.

d. CHECK—that the lower 1/4 of the screen displays reversed color bars.

e. Change P866, P876, and the front-panel WAVEFORM and WHITE switches according to Table 6-7.

f. CHECK—Test Pattern and Split Field functions of the 143 per Table 6-7.

In the Split Field mode the top part of the display is always normal color bars. In all cases the WHITE switch has the same function (up-100% white bar, down-75%).

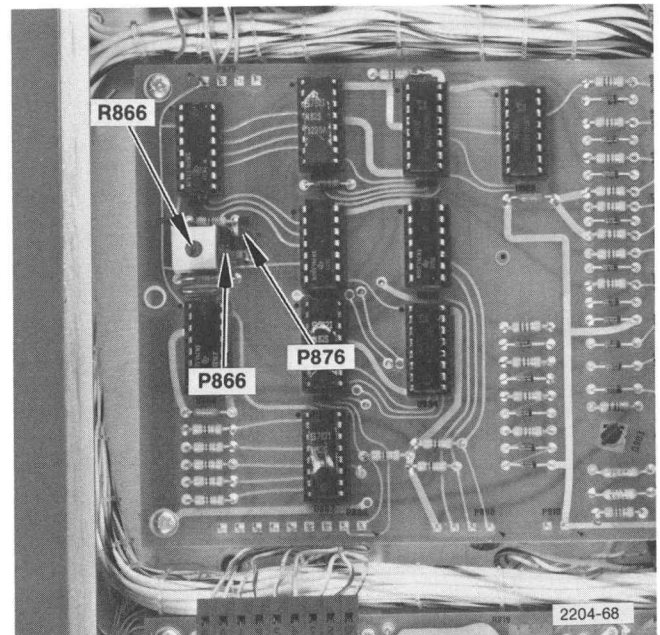


Fig. 6-21. Color Bar Logic Circuit Board.

Table 6-7

TEST PATTERN AND SPLIT FIELD FUNCTIONS

| Waveform | WHITE | P866 | P876 | Pattern |
|--------------|-------|------|------|---------------------------------|
| SPLIT FIELD | N | 1 | 1 | Reverse Color Bars |
| SPLIT FIELD | X | 1 | 1 | Reverse Color Bars |
| TEST PATTERN | N | 1 | 1 | Full Field Reverse Color Bars |
| TEST PATTERN | X | 1 | 1 | Full Field Reverse Color Bars |
| TEST PATTERN | X | 1 | 2 | Full Field Bk-Ye-R-Ye-Bk Bars |
| TEST PATTERN | N | 1 | 2 | Full Field Bk-Ye-R-Ye-Bk Bars |
| SPLIT FIELD | N | 1 | 2 | Black-Yellow-Red-Yellow-Black |
| SPLIT FIELD | X | 1 | 2 | Black-Yellow-Red-Yellow-Black |
| SPLIT FIELD | N | 2 | 2 | White Split Field |
| SPLIT FIELD | X | 2 | 2 | White Split Field |
| TEST PATTERN | N | 2 | 2 | Full Field White |
| TEST PATTERN | X | 2 | 2 | Full Field White |
| TEST PATTERN | X | 2 | 1 | Full Field Phase Sequenced Bars |
| TEST PATTERN | N | 2 | 1 | Full Field Phase Sequenced Bars |
| SPLIT FIELD | N | 2 | 1 | Phase Sequenced Color Bars |
| SPLIT FIELD | X | 2 | 1 | Phase Sequenced Color Bars |

g. Set P866 and P876 to the correct positions for the signal that provides the test pattern that is normally used in daily operation.

40. Check Field Identification Signals

a. Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.

b. Set the waveform monitor to view lines 8 and 9 of field 1 (10 μ s/div, digital line selection. A 1481 or 1485 Option 8 must be used to perform this check accurately).

c. CHECK—that the first identification signal (bottle) is D'B (lesser amplitude).

d. Set the 143 IDENT switch to OFF.

e. CHECK—that the identification signals are gone.

f. Set the IDENT switch to REV.

g. CHECK—that the D'R identification signal is now first.

h. Return the IDENT switch to the NORMAL SIGNAL position.

i. CHECK—that the ramp-up time of the identification signals (end of reference to full amplitude) is 15 μ s \pm 4 μ s for D'R and 18 μ s \pm 4 μ s for D'B.

41. Check Color Bar Luminance Amplitudes

a. Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.

b. Use the Variable Amplitude Calibrator, in the same manner described earlier, to measure the amplitudes of the individual colors.

c. Set the waveform monitor for a 1-line display.

d. Set all 143 front-panel switches to the up, NORMAL SIGNAL position.

e. Set the 143 SUBCARRIER AMPLITUDE switch to OFF.

f. CHECK—luminance levels. Table 6-8 provides the amplitudes and tolerances Fig. 6-22 shows how to compare levels.

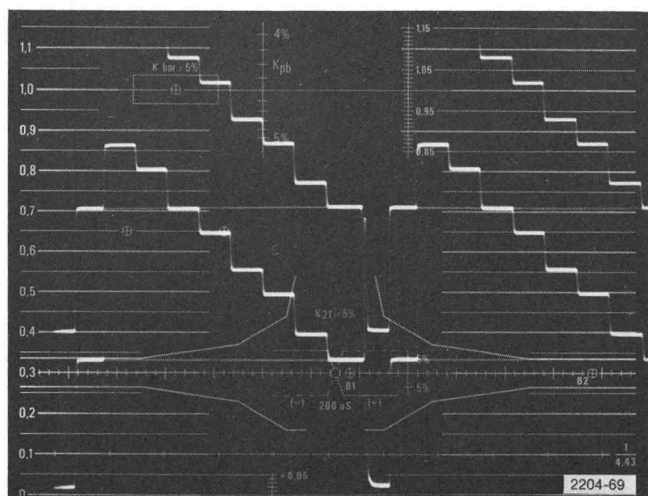


Fig. 6-22. Interpreting luminance levels.

42. Check/Adjust Chrominance/Luminance Timing

a. Connect the 143 COMPOSITE VIDEO OUTPUT to the waveform monitor input. Terminate the other loop-thru input in 75 ohms.

b. Set the waveform monitor for a 1-line display and use the variable line selector to place a D'R line on the screen.

c. Place the red-blue transition at the graticule center.

d. Set the 143 Y and PRE-EMPHASIS switches to OFF, all others to NORMAL SIGNAL position.

Table 6-8

COLOR BAR LUMINANCE AMPLITUDE

| AMPL Switch | Color | Luminance Amplitude | Tolerance |
|-------------------------|---------|---------------------|-----------|
| 75% (WHITE switch down) | white | 525 mV | ±5.2 mV |
| 75% | yellow | 465.2 mV | ±4.6 mV |
| 75% | cyan | 368 mV | ±3.7 mV |
| 75% | green | 308.2 mV | ±3.1 mV |
| 75% | magenta | 216.8 mV | ±2.2 mV |
| 75% | red | 157 mV | ±1.6 mV |
| 75% | blue | 59.9 mV | ±1.5 mV |
| 25% (WHITE switch down) | white | 175 mV | ±1.7 mV |
| 25% | yellow | 155.1 mV | ±1.5 mV |
| 25% | cyan | 122.7 mV | ±1.5 mV |
| 25% | green | 102.7 mV | ±1.5 mV |
| 25% | magenta | 72.3 mV | ±1.5 mV |
| 25% | red | 52.3 mV | ±1.5 mV |
| 25% | blue | 20 mV | ±1.5 mV |
| 100% | white | 700 mV | ±7.0 mV |
| 100% | yellow | 620.2 mV | ±6.2 mV |
| 100% | cyan | 490.7 mV | ±4.9 mV |
| 100% | green | 410.9 mV | ±4.1 mV |
| 100% | magenta | 289.1 mV | ±2.9 mV |
| 100% | red | 209.3 mV | ±2.1 mV |
| 100% | blue | 79.8 mV | ±1.5 mV |

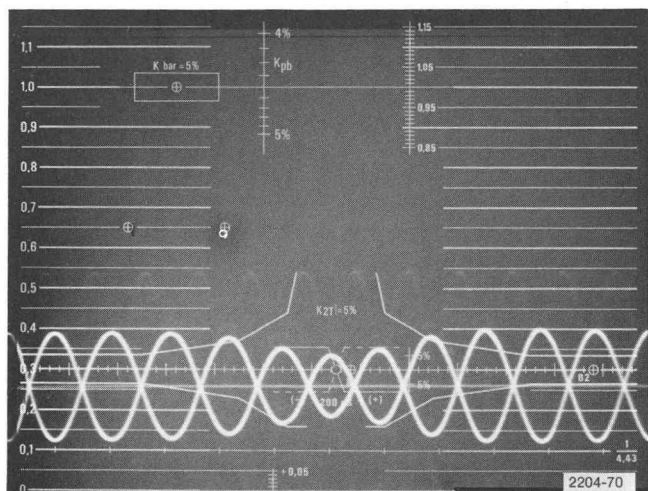


Fig. 6-23. Chrominance/Luminance timing.

e. Change the waveform monitor sweep to $0.1 \mu\text{s}/\text{div}$ (X50 mag). Reposition so that the exact center of the red-blue transition is at graticule center. See Fig. 6-23.

f. Set the 143 switch to ON and the SUBCARRIER AMPLITUDE switch to OFF.

g. CHECK—that the luminance transition is within 50 ns ($1/2$ div) of graticule center.

h. ADJUST—Chrominance/Luminance Delay, R866 (Fig. 6-21), to place the luminance transition at graticule center.

i. Set all 143 front-panel switches to the NORMAL SIGNAL position.

PULSE OUTPUT

43. Check/Adjust Output Compensations

a. Connect the 143 FoB SUBCARRIER output, through a 75-ohm termination, to the test oscilloscope vertical input.

b. CHECK—for approximately 1.0 V signal amplitude.

c. ADJUST—FoB Gain, L587 (Fig. 6-24), for maximum amplitude.

d. Change the test oscilloscope cable to the FoR SUBCARRIER output.

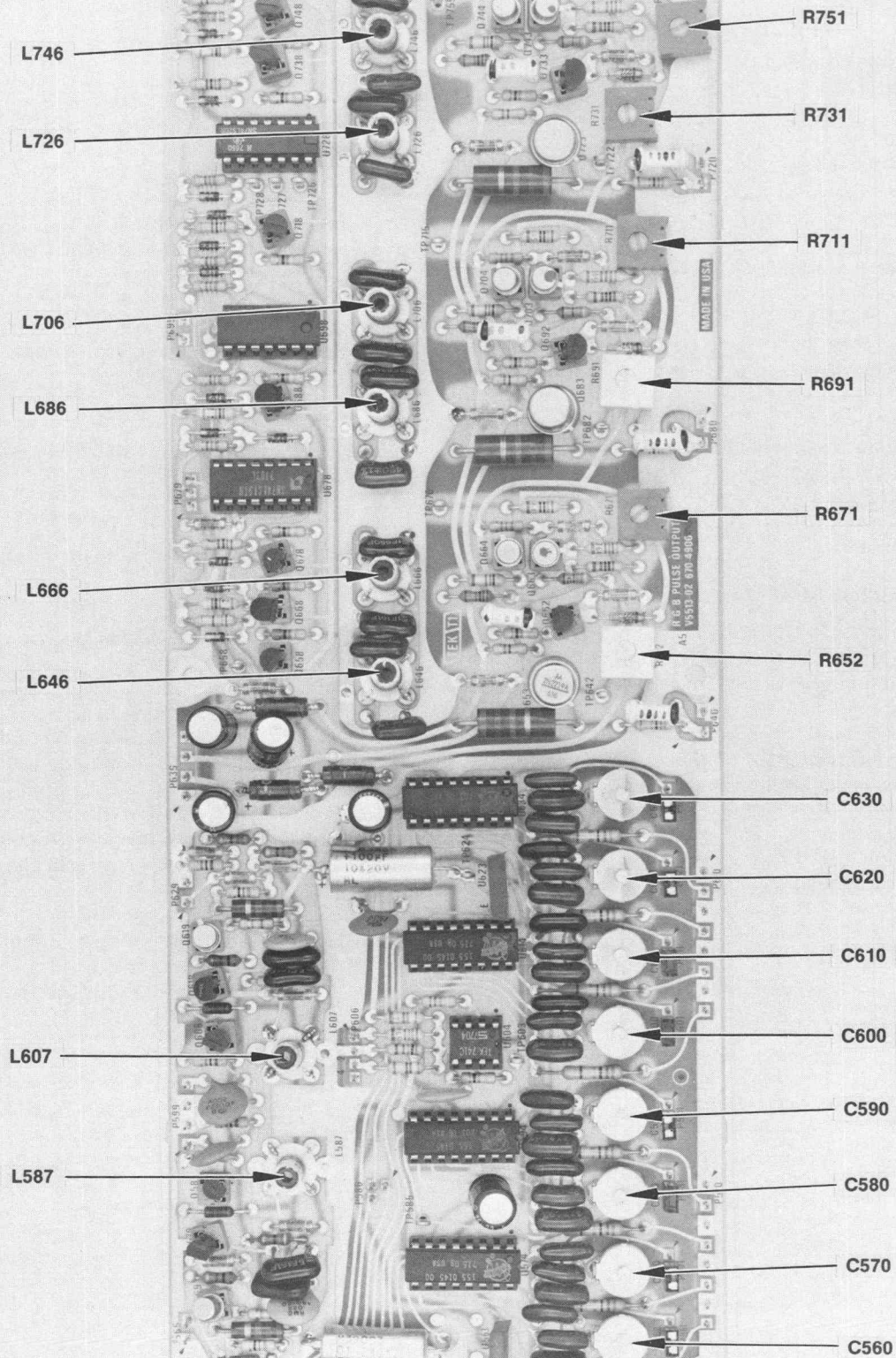
e. CHECK—for approximately 1.0 V signal amplitude.

f. ADJUST—FoR Gain, L607 (Fig. 6-24), for maximum amplitude.

g. CHECK and/or ADJUST—all output compensations according to Table 6-9. The output amplitude of all signals should be 3.8 to 4.2 V. Do not adjust compensations unless rise-and falltimes are out of tolerance.

Table 6-9
OUTPUT COMPENSATION

| Output | Risetime/Falltime | Adjust | For |
|-----------------------|-------------------|--------|--------|
| Composite Blanking | 200-300 ns | C590 | 250 ns |
| Composite Sync | 200-300 ns | C630 | 250 ns |
| (rear panel) | 200-300 ns | C620 | 250 ns |
| 7.8 kHz (front panel) | 200-300 ns | C580 | 250 ns |
| 7.8 kHz (rear panel) | 200-300 ns | C600 | 250 ns |
| Line Drive | 200-300 ns | C560 | 250 ns |
| Field Drive | 200-300 ns | C610 | 250 ns |
| 12.5 Hz | 200-300 ns | C570 | 250 ns |



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Fig. 6-24. Pulse Output Circuit Board.

44. Check Passive Isolation (COMPOSITE VIDEO, COMPOSITE SYNC, and CONVERGENCE)

a. Connect the 143 front-panel COMPOSITE VIDEO OUTPUT through a 75-ohm termination, to the test oscilloscope vertical input.

b. Observe the composite video signal on the test oscilloscope.

c. Short the rear-panel COMPOSITE VIDEO OUTPUT.

d. CHECK—for less than a 1% change in amplitude.

e. Repeat this step, substituting the COMPOSITE SYNC and CONVERGENCE for COMPOSITE VIDEO.

45. Check/Adjust RGB Outputs

a. Connect the 143 COMPOSITE SYNC OUTPUT to the waveform monitor external sync input. Terminate the other loop-thru input in 75 ohms.

b. Connect the 143 GREEN OUTPUT to the waveform monitor signal input. Terminate the other loop-thru input in 75 ohms.

c. Set the waveform monitor for a 0.1 μ s/div sweep rate.

d. CHECK—for square corners on the transitions.

e. ADJUST—Green Pulse Shaping, L646 and L666 (Fig. 6-24), for best corners.

f. Set the waveform monitor for a 0.1 μ s/div sweep rate.

g. CHECK—white bar risetime. Risetime should be 85 to 115 ns.

h. Return sweep time to a 1-line display. Connect the Variable Amplitude Calibrator to the waveform monitor J9034 (on the rear panel).

i. CHECK—the green pulse amplitude. Amplitude should be 519.7 mV to 530.2 mV.

j. ADJUST—Green Gain, R652 (Fig. 6-24), for 525 mV \pm 5.2 mV.

k. CHECK—the dc level at blanking for 0 V \pm 50 mV.

l. ADJUST—Green Dc Level, R671 (Fig. 6-24), for 0 V (\pm 50 mV) at blanking level.

m. CHECK—the white bar amplitude for 700 mV \pm 7 mV, using the Variable Amplitude Calibrator.

n. CHECK—sync amplitude (green only) for 300 mV \pm 6 mV, using the Variable Amplitude Calibrator.

o. CHECK—remaining outputs, using Table 6-10 and Step 45, parts d and l (substituting red and blue for green). Sync signal is added only to the GREEN OUTPUT.

Table 6-10
RGB OUTPUTS

| Adjustments | Output | Adjust | Set For |
|---------------|--------------|-------------|---------------------|
| Pulse Shaping | Green | L646 & L666 | Square Corners |
| | Red | L686 & L706 | |
| | Blue | L726 & L746 | |
| Gain | Green | R652 | 525 mV \pm 5.2 mV |
| | Red | R691 | |
| | Blue | R731 | |
| Dc Level | Green | R671 | 0 V \pm 50 mV |
| | Red | R711 | |
| | Blue | R751 | |
| Sync | Green (only) | Check | 300 mV \pm 6 mV |

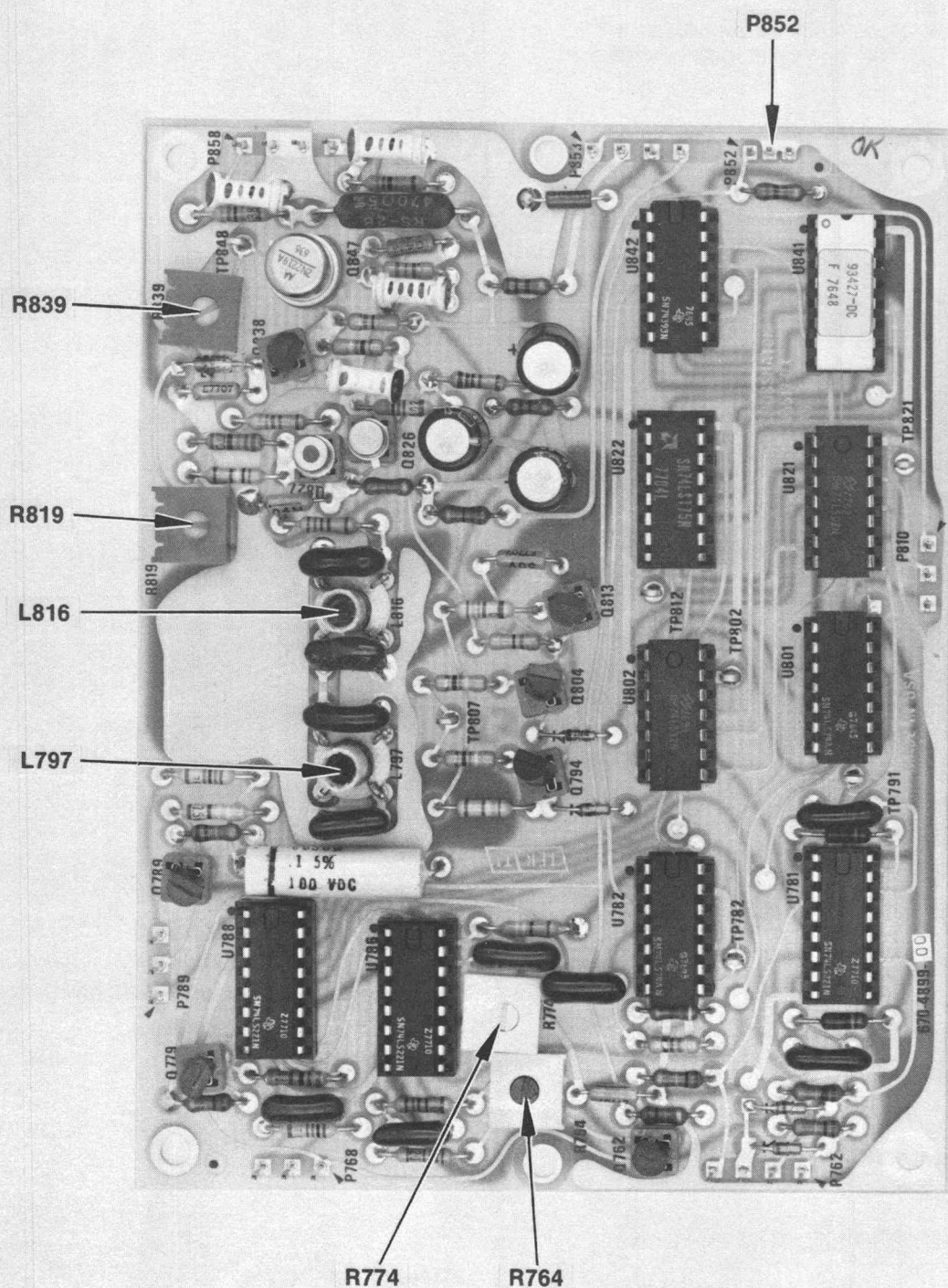


Fig. 6-25. Crosshatch Circuit Board.

CROSSHATCH

46. Check/Adjust Sync Shape

a. Connect the 143 CONVERGENCE output, through a 75-ohm termination, to the test oscilloscope vertical input.

b. CHECK—sync pulses for square corners, free of excessive overshoot or rounding.

c. ADJUST—Sync Pulse Shaping, L797 and L816 (Fig. 6-25), for optimum square corners on the sync pulses.

d. CHECK—convergence pulses for square corners, free of excessive overshoot or rounding.

47. Check Pulse Risetimes

a. Connect the 143 CONVERGENCE output, through a 75-ohm termination, to the test oscilloscope vertical input.

b. CHECK—that the convergence pulses are positive-going (positive polarity).

c. CHECK—convergence pulse risetime and falltime for 100 ns \pm 15 ns. See Fig. 6-26.

d. CHECK—sync pulse risetime and falltime for 100 ns \pm 15 ns.

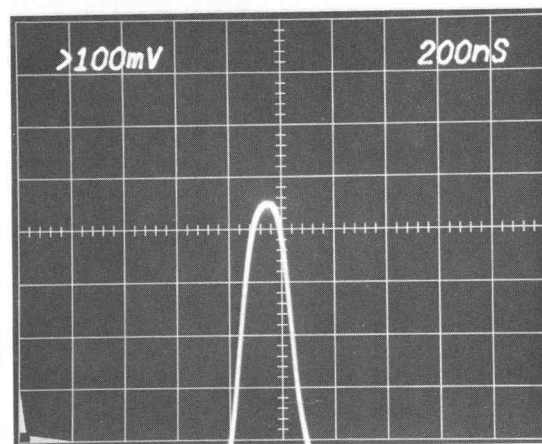
48. Check/Adjust Sync Amplitude

a. Connect the 143 CONVERGENCE output to the video input of the waveform monitor. Terminate the other loop-thru input in 75 ohms.

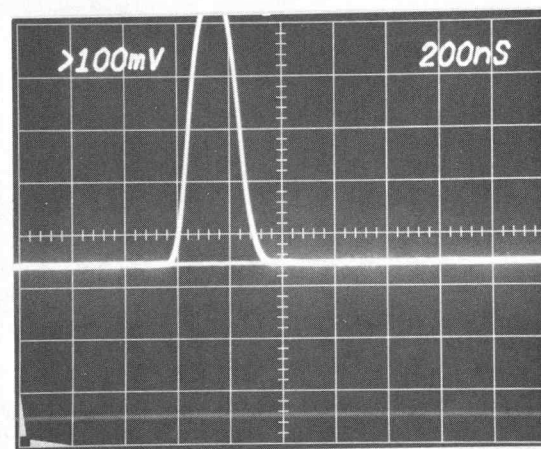
b. CHECK—sync amplitude for 300 mV \pm 15 mV.

c. ADJUST—Convergence Gain, R839 (Fig. 6-25), for 300 mV.

d. INTERACTION—between Convergence Gain and Convergence DC Level is common. If Convergence Gain is adjusted, Convergence DC Level (Step 49) must also be adjusted.



Risetime



Falltime

2204-73

Fig. 6-26. Measuring Rise & Falltime.

49. Check/Adjust Convergence DC Level

a. Connect the 143 CONVERGENCE output, through a 75 ohm termination, to the test oscilloscope vertical input.

b. CHECK—the Convergence DC Level for 0 V \pm 50 mV.

c. ADJUST—Convergence DC Level, R819, for 0 V.

50. Check Vertical Line and Dot Pulse Duration

a. Connect the 143 CONVERGENCE output, through a 75-ohm termination, to the test oscilloscope vertical input.

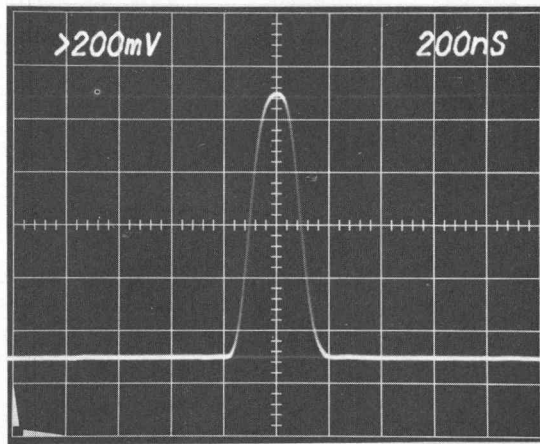


Fig. 6-27. Measuring Dot pulse Half-Amplitude Duration (HAD).

b. CHECK—the HAD (half amplitude duration) of the vertical line pulses for 200 ns \pm 30 ns. See Fig. 6-27.

c. CHECK—the HAD of the vertical dot pulses for 200 ns \pm 30 ns.

51. Check/Adjust Large Square Width

a. Connect the 143 CONVERGENCE output, through a 75-ohm termination, to the test oscilloscope vertical input.

b. Check that the jumper P852 is in the 2-3 position. See Fig. 6-25.

c. Set the 143 HORIZONTAL POSITION to the center of its range.

d. CHECK—that each line contains 9 pulses and that there is approximately 6.3 μ s between pulses.

e. ADJUST—the 315 kHz Adj, R774 (Fig. 6-25), for 6.3 μ s between pulses.

f. INTERACTION—exists between the adjustment in this step and the adjustment in Step 52, so if one is adjusted, both must be done.

52. Check/Adjust Small Square Width

a. Connect the 143 CONVERGENCE output, through a 75-ohm termination, to the test oscilloscope vertical input.

b. Change the 143 plug-jumper P852, located on the Convergence board, to pins 1 & 2.

c. Set the 143 HORIZONTAL POSITION to the center of its range.

d. CHECK—for 17 pulses per line, and approximately 3.18 μ s between pulses.

e. ADJUST—the 630 kHz Adj, R764 (Fig. 6-25), for 3.18 μ s between pulses.

53. Check Position Range

a. Connect the 143 CONVERGENCE output to the picture monitor input. Terminate the other loop-thru input in 75 ohms.

b. CHECK—range of the 143 front-panel POSITION controls. They must be able to position the display at least one full division vertically or horizontally.

c. Change plug-jumper P852 (Fig. 6-25) on the Convergence board to pins 2 & 3.

d. CHECK—range of the 143 front-panel POSITION controls. They must be able to position the display at least one full division vertically or horizontally.

OPTIONAL CHECK

There are some parameters specified for the 143 that do not need to be checked as a routine part of readjustment or checkout. These are Active Isolation and Return Loss. The following steps outline how these tests may be made and the equipment required to make them.

54. Check Active Isolation

Equipment Required: No additional equipment beyond that listed under TEST EQUIPMENT near the beginning of this section.

a. Connect the 143 COMPOSITE VIDEO OUTPUT (rear panel), through a 75-ohm termination, to the test oscilloscope vertical input.

b. Connect the output of the leveled sinewave generator, through a 75-ohm termination, to the 143 front-panel COMPOSITE VIDEO OUTPUT.

c. Set the leveled sinewave generator frequency for 4.406 MHz.

d. Set the 143 SUBCARRIER AMPLITUDE switch to OFF.

e. CHECK—that the 4.406 MHz sinewave, as observed on the test oscilloscope, is -40 dB or greater with respect to the amplitude at the sinewave generator output, as the amplitude is varied from 0.5 V to 4.0 V.

f. CHECK—CONVERGENCE outputs and COMPOSITE SYNC outputs for -40 dB or greater isolation,

using the same method as described for the COMPOSITE VIDEO OUTPUTS.

55. Check Return Loss

Equipment Required: A Return Loss Bridge (Tektronix Part No. 015-0149-00).

NOTE

The instruction manual supplied with the Return Loss Bridge gives detailed information on making return loss measurements for those that are unfamiliar with the technique. The following procedure should give sufficient information for those who are familiar with return loss measurements.

a. Connect the Return Loss Bridge to the test oscilloscope vertical inputs. Set the vertical mode to added.

b. Connect the leveled sinewave generator output to the Return Loss Bridge. Set the generator amplitude for a 250 mV output signal.

c. Balance the bridge with both terminations in place.

d. CHECK—return loss as listed in Table 6-11.

Table 6-11
RETURN LOSS MEASUREMENTS

| Check Output | Frequency Range | For | 143 Operation |
|-----------------------------|-----------------|-------|------------------|
| CONVERGENCE | 50 kHz—5 MHz | 35 dB | POWER ON and OFF |
| VIDEO INPUT | 50 kHz—5 MHz | 46 dB | POWER ON and OFF |
| LINE DRIVE | 50 kHz—4 MHz | 30 dB | POWER ON and OFF |
| FIELD DRIVE | | | |
| 7.8 kHz (LINE BLANKING) | | | |
| 12.5 Hz (FIELD BLANKING) | | | |
| COMPOSITE SYNC | | | |
| COMPOSITE BLANKING | | | |
| RED | 50 kHz—6 MHz | 36 dB | POWER ON and OFF |
| GREEN | | | |
| BLUE | | | |
| COMPOSITE VIDEO | 50 kHz—7 MHz | 36 dB | POWER ON and OFF |

Section 7

THEORY OF OPERATION

This section of the manual provides the user with two separate looks at the 143. The first is an overview, intended to provide the reader with a general look at how the 143 operates. The second is a more detailed circuit-by-circuit look at the instrument.

The overview or block diagram discussion ties all of the circuits together, while the Circuit Description provides an in-depth look into how the individual circuits operate.

BLOCK DIAGRAM

The most important consideration for a generator, such as the 143, is accuracy. Not only accurate color, but more importantly, accurate timing. The 143 has two possible sources for its timing signals. One is its own crystal-controlled Reference Oscillator and the other is an outside SECAM signal source, through the process known as "Gen Lock". As you will see, a lot of consideration and circuitry is devoted to gen lock.

The internal Reference Oscillator is crystal-controlled and well within the tolerance necessary to generate accurate line and field sync as well as the 143's complement of color test signals.

When another SECAM signal is employed as an outside reference, it is passed through a Bell Filter, detected, and the color sequence is detected. Sync is also separated at this time for use in the sync and timing circuits.

Subcarrier from the external reference signal is detected for amplitude as well as frequency deviation, and if both are present (indicating a valid SECAM signal) the color sequence is detected and an enable signal is applied along with the internally-generated sync to the Timing Logic.

The 143 employs a monolithic Sync Generator integrated circuit, clocked by an accurate 10 MHz Oscillator.

Timing signals for all operations in the 143 are generated in the Timing Logic circuits, which include a programmable read only memory (PROM) and a latch flip-flop. These timing signals are provided to the Modulator, Chroma Blanking, Convergence, and Color Bar Logic circuits.

The Color Bar Logic circuit generates currents proportional to the luminance signal and the color difference signals. The luminance current goes through a low-pass filter to the Video Output Amplifier, where it is combined with the chrominance signal. Currents that are proportional to the color difference signals are pre-emphasized and applied to the Modulator.

The color-difference signal currents are converted into voltage signals in the Modulator Input Amplifier, and then clipped before driving the Modulator's Voltage-Controlled Oscillator (VCO). The VCO output passes through an inverse Bell Filter to the Video Output Amplifier, where the luminance current and sync are added to it to form the composite SECAM output.

In addition to a composite SECAM video signal, the 143 Output Amplifier provides the most commonly used TV synchronizing, timing, and blanking signals. The 143 also provides separate RGB output, and a versatile Convergence signal.

DIAGRAM 1

POWER SUPPLY

The power supply circuits provide three regulated voltage supplies; -15 V , $+5\text{ V}$, and $+15\text{ V}$. Electronic regulation is used to provide stable, low-ripple output voltages. All the supplies are current-limited to prevent instrument damage in the event a supply is shorted to ground. The primary circuit of the transformer employs voltage selection for the appropriate mains voltage operating range.

Power Input

Power is applied to the primary winding of the power transformer via an RFI filter. The RFI filter serves to prevent external rf interference from appearing on the power supplies, or signals generated within the 143 from being introduced onto the ac line.

—15 Volt Supply

The —15 V supply provides the reference voltage for the +5 V and +15 V supplies. The reference for the —15 V supply is a 9.1 V zener diode, VR31.

The secondary voltage from the power transformer is full-wave bridge rectified, filtered, and applied to the —15 V series-regulator, Q80, and subsequently to the load. Series-regulator, Q80, and its driver, Q49, are controlled by a voltage comparator consisting of Q45 and Q43 and associated components.

Q43 in the voltage comparator is referenced to —6 V, supplied by the 9.1 V zener diode, VR31. Any noise generated by the zener diode is filtered by C38. The current through R31 is shared by Q45 and Q43. The amount of current to each transistor is determined by the resistor network at the base of Q45. This network consists of R32, R34, R41, and the —15 V adjustment (R40). As Q45 takes more or less current, depending on the setting of R40, Q45 will lose or gain current. The collector of Q43 feeds the driver transistor, Q49, which in turn drives series-regulator Q80. The series-regulator supplies current to the load to maintain a constant output voltage. R47 and C41 suppress any oscillation in the voltage comparator.

Overload protection is provided by Q47 and associated components. Q47 is normally off, but if the —15 V supply current becomes excessive, enough voltage will be developed across R44 to forward-bias Q47. Q47 then reduces the drive to Q49 and limits the amount of current through the series-regulator, Q80.

+5 Volt Supply

The +5 V supply operation is similar to the —15 V supply. The output of the power transformer secondary is full-wave rectified and filtered. The +5 V supply is also series-regulated, by Q97. Operation of the remainder of the supply is identical to the —15 V supply.

Power for the POWER ON indicator is from the +5 V supply through limiting resistor, R1.

+15 Volt Supply

Operation of the +15 V supply is identical to the —15 V except that the —15 V supply serves as the reference, rather than a zener diode. Q99 is the series-regulator for the +15 V.

DIAGRAM 2 REFERENCE OSCILLATOR

The Reference Oscillator diagram contains an oven-stabilized crystal reference, from which the FoB, FoR, and sync circuits derive their timing. Also contained on this diagram is the External Sync to Subcarrier Lock, used for the "Gen Lock" mode.

Oven

Q147 is used as the heater for the proportional control oven. A thermistor, Rt128, controls the amount of conduction of the transistor.

At a temperature of 25°C, Rt128 has a value of 100 k Ω , setting the bias of Q129 at a point that allows a high rate of conduction. The conduction of Q129 turns Q147, a Darlington pair, on hard to rapidly increase the temperature in the oven. As oven temperature increases, the resistance of Rt128 decreases. When the value of Rt128 decreases, the base bias for Q129 rises until operating temperature equilibrium is reached as the heat generated by Q147 exactly equals the heat lost to the ambient atmosphere. A decrease in oven temperature results in increased resistance for Rt128, which in turn increases conduction in the transistors. In this manner, a stable operating temperature is maintained.

8.8 MHz Oscillator

Q146 and Y128 form a crystal-controlled oscillator, with its frequency adjustment accomplished by C116 and CR136, a varicap. The crystal oscillates at 8.8125 MHz when the crystal looks into 33 pF. This criteria is met by C116, C126, and CR136. The feedback loop is through the emitter of Q146 and C156.

The frequency of the 8.8 MHz Oscillator is controlled by C116 when the 143 is not in the "Gen Lock" mode. In "Gen Lock" the voltage from U112 is used to control the oscillator.

564 Divider

The output of the 8.8 MHz Oscillator drives U154B, which divides by two, to yield the FoR frequency 4.40625 MHz. The FoR subcarrier is buffered by U174A and then drives the FoR shaping circuitry (on Diagram 6).

U154B also drives U153 and U172 to divide the 4.40625 MHz subcarrier by 141. U153 and U172 are loaded when the load input goes low and the positive edge of the clock occurs. U153 is loaded with a binary 3 and U172 with a binary 7. The 'carry' output of U153 enables one count of U172. U153 counts from 3 to 15 and then advances U172 by one count, then counts from 0 to 15 until U172 advances to a count of 15. At count 15, U172 generates a 'carry' output; U172's 'carry' then becomes the load pulse for both U153 and U172. The load pulse then starts the sequence over again.

U153 counts from 3 to 15 (12 counts, plus one during the load), or a total of 13 clocks pulses. This operation continues until U172 has counted from 7 to 15 (a total of 8 counts). The total count is 8 (for U172) times 16 (U153's 0 to 15 count) plus 13 from the first U153, count, or 141.

U154A divides the output of U172 by 2 to yield a 15.625 kHz square wave, the line rate.

8.5 MHz Lock

The line-rate square wave at U154A is used to frequency-and phase-lock the 8.5 MHz Oscillator. The line-rate square wave switches diode switch, CR166-CR167 (CR167 is normally conducting).

Q169 generates a positive-going ramp that is clamped by Q168. At the falling edge of the line-rate square wave, the diode switch reverts to its original condition and the collector of Q169 ramps back to ground.

The Q output of U175B, a line-rate square wave, is fed back to Q189 to generate a sampling pulse at the center of the ramp generated by Q169. Q189 is turned off, turning on Q179 and allowing the ramp level, at that time, to be stored in C179, the memory capacitor. This memory level goes through a voltage follower, U199B, and rate limiter, U199A, to CR229, the frequency control for the 8.5 MHz Oscillator.

8.5 MHz Oscillator

The 8.5 MHz Oscillator works the same way as the 8.8 MHz Oscillator, except that L207 replaces the crystal.

The output of the oscillator is divided by 2 to provide the FoB frequency, 4.250 MHz.

544 Divider

Operation of the 544 divider similar to that of the 564 divider, discussed earlier. The difference is that an 8 count is loaded into the first counter, U205, modifying the counter for a divide-by-136 function.

8.8 MHz Lock

The 8.8 MHz Lock circuitry operates only in the "Gen Lock" mode with sync present on the COMPOSITE VIDEO input. When these conditions are met, the 8.8 MHz Oscillator is locked to incoming sync.

In the "Gen Lock" mode, line sync that has been squared (Diagram 3) is applied to diode switch CR121-CR111. The circuit operates in the same manner as the 8.5 MHz Lock.

The error signal to CR136 is picked off at the wiper of R105. The rate-limiting amplifier output is fed back through a Darlington pair, Q124, to the error amplifier input. A Darlington pair is used so that the current demand of the feedback loop does not affect the frequency control with temperature change.

U152A delays the ramp sampling pulse to Q131 by an amount set by R153. This allows the 143 to switch from "Gen Lock" to internal frequency without a timing jump.

Q114 and Q99 are off in the "Gen Lock" mode, allowing U112B to control the 8.8 MHz Oscillator frequency. In the internal mode of operation, Q115 and Q99 are on, applying +15 V and ground across R105.

Phase and Frequency Sequencing

U202B & D alternately (line to line) apply FoB or FoR subcarrier to U202C. U201A & B determine the line phase sequencing (one line out of every three inverted). U171D inverts the line phase sequencing on alternate fields.

This sequencing makes the output of U171C the FoB subcarrier reference on one line and the FoR subcarrier reference on the following line. Every third line and every other field, the output of U171C is inverted. This is the phase and frequency reference for the line burst.

DIAGRAM 3

SYNC SEPARATOR & SYNC SWITCHING LOGIC

The circuits on this diagram are used to separate and process the composite sync used for the generator lockup reference.

Sync Stripper

Composite video from the Gen Lock COMPOSITE VIDEO input is applied to pin 16 of U529, the sync stripper IC. This input signal is also taken off at the input network and applied to the chrominance strip filter (Bell Filter) for the chrominance processing (Diagram 4). Pin 5 of U529 is the composite sync output.

Field Sync Strip

U406A gates composite sync to the field sync stripper. The field sync stripper is composed of Q371, Q361, Q331, Q321, and their associated circuitry. U300 and U301 yield a correctly placed field sync signal, which is applied to a counter on Diagram 5 and is subsequently used by the sync generator IC. This signal then becomes the field sync for the 143 composite outputs. U303A is the field sync present sensor. Its Q output will be high when field sync is present, \bar{Q} will be high when sync is absent. The Q output drives the SYNC UNLOCKED indicator, which is lit when no incoming sync reference is present. U408A, U408B, U408D form the SBU II gate. This gating circuit, in applications other than SBU II, performs a dummy gating function. Its output will always be high to enable U406A.

Gen Lock Mode Switch

U406C serves to control the "Gen Lock Mode". S97 sets a low (ground) on one of the inputs to U406C, whose output then goes high to provide an enable to U406A. When U406C goes low, U303A, the sync present detector, resets.

D'B Signal Generator

U406B provides one of the possible clock pulses to U386A, the D'B Signal Generator flip-flop. This pulse occurs when the D'B pulse from Diagram 4 and the sync present output of U303A are both present. The output of U406B will be a low when pin 5 is high and sync is present. This output and the \bar{H} pulse from U283F (Diagram 5) are applied to U385B, an exclusive OR-Gate. A clock pulse will be generated when one of the two inputs goes high. U386A, which generates the D'B signal, is a positive-edge triggered D flip-flop. It will change state on each clock pulse, generating a square wave at half the line rate.

12.5 Hz Generator

U280B is another D flip-flop, used to generate the 12.5 Hz squarewave. Its D input is from the D'B pulse, and it is clocked by a one-half field rate pulse from the sync generator. The output of U280B will be a logic high for fields one and two and a low for field three and four.

Squared H Generator

U368A and B are one-shot multivibrators. C367 and R387 control the time-constant for U368A, C359 and R389 dictate U368B's time-constant. U408C is enabled by the sync present output and composite sync from U406A. U385A will set the A input of U368B high when U408C pin 8 goes low. B input will be high as long as sync is present. U368A has its B input tied low and the A input follows the output of U368B. Q is the square H-rate pulse, \bar{Q} its complement. The square H-rate pulse is used by the Sync Generator (Diagram 5).

DIAGRAM 4

CHROMA SEQUENCE DETECTORS

Circuits on this diagram detect the presence of frequency modulation and color subcarrier, determine if the signal is following the SECAM sequence, and if the correct line-by-line sequence is being maintained. These circuits drive the SUBCARRIER ABSENT indicator and generate the Add Line pulse, used to properly align D'R and D'B lines.

Amplitude Detector

This circuit consists of U521, a balanced demodulator, whose output is the product of the input voltage (pins 1 and 4) and a switching function or carrier (pins 7 and 8). It is followed by a low-pass filter and Q481, an emitter-follower.

Q482 clamps at sync time. The output of U471 will be high if an amplitude is detected. The output of U471 enables U443C. The other signal to U443C is the sampling strobe (from diagram 5). Its output goes to the Subcarrier Absent stage and to U443A. U443A is enabled when the D'B signal and the output of the Amplitude Detector are coincident.

The D'B signal and the strobe are used to form a clamping signal for the output of the Discriminator-Limiter and the Reset pulse to U411A & D, in the SECAM detector.

Bell Filter

Q557 and Q556 are the active elements of a Bell Filter. R554 sets filter Q, and L523 adjusts center frequency.

Discriminator-Limiter

U535 is a limiter amplifier and discriminator in a single package. Input is across pins 4 and 5, with the discriminator output from pin 14. L513 and R495 set the discriminator center frequency and bandwidth.

The output filter is a low-pass filter. Q479 is the filter output amplifier, and Q469 is an emitter-follower used to drive the clamped amplifier. U439 is the output amplifier, clamped during D'B line burst time by Q459.

Chrominance Sequence Detector

Q394 and Q404 perform an OR function. If Q394's base goes low, and Add Line pulse will be generated.

U412 is an integrator with current provided from either of two sources. If no sequence error is detected, the current path is through R433, CR444, and CR433. CR433 and CR423 are switching diodes. When a sequence error does occur, the current source is switched to R422, causing U412 to commence a ramp. The ramp becomes the negative pulse at the base of Q394. If a signal other than SECAM is present, CR422 will prevent switching of the current paths (R433 is always the current source).

SECAM Detector

U415A, enabled by the output of either U418 or U429, provides an enable to U415B. U415B's other input is the D'B timed output of the Amplitude Detector.

U415B's inverted output is the Set pulse for U411A & D; the Reset is the strobed D'B signal. The Q output enables U441A, a one-shot multivibrator along with the D'B timed Amplitude Detector output provide the Up and Down pulses for U391.

U391's Carry and Borrow outputs supply the Set and Reset pulses to U363B. When a SECAM subcarrier has been detected, the output of U363B will be low.

Subcarrier Absent

When Q390 is held off, the SUBCARRIER ABSENT light will remain off. Both inputs to the base of Q390 must be low.

If there is no detected waveform output from the Amplitude Detector, U441B will not change states and its output will be high. In the same way, if the SECAM Detector does not detect a SECAM subcarrier, the Q output of U363B will be high. If either flip-flop or one-shot output is high the SUBCARRIER ABSENT light will be on.

DIAGRAM 5

SYNC GENERATOR & TIMING LOGIC

Circuits on this diagram provide the sync and timing signals used by the 143 to generate the SECAM test signals.

Sync Lock

Squared H pulses (from diagram 3) enable Q345, a ramp generator. U303B triggers on the leading edge of the Line Drive pulse from U255 (sync Generator). Its output pulse is about 500 ns, occurring during the leading edge of the ramp. This pulse turns off Q313, turning on Q315. When Q315 turns on, the level at its emitter is stored in C317. U318B is a voltage-follower. It applies the stored level to U318A, the phase lock amplifier.

If the Squared H pulses and the inverted Line Drive pulses are coincident, Q327 will be off and R328 will be in the circuit. If coincidence is lost, U280A will change state and clock U300A, which in turn generates a pulse to turn off Q305. When Q305 goes off, Q327 turns on and R328 is shorted.

U280A will not change state if the Line Drive pulse is present on the D input when the clock pulse (Squared H pulse) arrives. If the Line Drive pulse is not present, U280A changes state, and stays in the new state until the inverted Line Drive pulse is again present at clock time.

If sync is unlocked, the memory capacitor (C317) will not be at the correct charge level, because the ramp sample will be taken at the wrong time. Shorting R328 increases the gain of the U318 stage to speed the lock-up process. The output of U318A provides an error-correction voltage to the 10 MHz Oscillator.

10 MHz Oscillator

The 10 MHz Oscillator is a modified Colpitts configuration. Its frequency is primarily determined by C289, C299, and L289. A varicap, CR309, is used to correct oscillator frequency when an error voltage, generated by the Sync Lock loop, is present.

Clock Drivers

The 10 MHz Oscillator signal is divided by two at U286A. Both Q and \bar{Q} outputs are used to clock the Sync Generator IC, U255.

The driver amplifiers increase the squared 5 MHz outputs of U286A to approximately 30 V for the clock inputs of U255.

Field Reset

The V pulse from U301 (diagram 3) is applied to the D input of U286B. U286B is clocked by the leading edge of the inverted line pulse (\bar{H}). When the V pulse is present on D at clock time, \bar{Q} goes low, presetting U306 to its initial state if both T and P inputs go high (T is high in line and field gen lock or internal operating modes). Qd (wired to P) will also be high, enabling a count when the \bar{H} pulse arrives. After four counts, a carry-out pulse is generated. This pulse is the Field Reset pulse for U255.

Q316 is a common-base amplifier used to increase the amplitude of the Field Reset pulse.

Sync Generator

U255 is a MOS/Large Scale Integration (LSI) device. It is clocked by two opposite polarity 5 MHz pulses and generates the pulses required to operate the rest of the system.

The 5 MHz clock pulses are counted down, internally, to 1 MHz (64 H).

Pulses counted down from 64 H to H are available as outputs from U255. Each of the outputs from U255 is buffered to make its amplitude compatible with the TTL logic that follows. U243, U247, and U263 are the buffers. U263 also serves as an inverter.

Strobe Timing

When "GEN LOCK" is operating in LINE mode, U477A is enabled, providing a low to U475A, which in turn provides the triggering signal to a pair of one-shot multivibrators (U445A & B). When line-rate strobes are called for, (LINE GEN LOCK) one will be generated for each active line.

In the LINE mode, U477C is also enabled to produce a low output (disable for U475B). When the mode is switched to FIELD, U477C is no longer enabled and its output goes high. U475D is enabled throughout the field, except for lines 7 through 15 (Field Identification signals). This combination of signals enables U475B for nine lines (7—15), allowing U475A to trigger the one-shot multivibrators only nine times each field, coincident with the Field Identification signals.

U477A is disabled by the switched ground applied to pin 2 in the FIELD mode.

R457 is the Strobe Position adjustment.

Identification Enable

U281 is a synchronous Up/Down counter, clocked by composite sync. It is started at line 6, when the Field Drive pulse ends. It counts up five counts, sets the RS flip-flop (U261C and D), which changes the level on the Up/Down input (makes it high), and the counter counts down eight counts. When the counter has counted down the eight counts, the Min/Max output goes high (signifying end of count) the enable input goes high and U281 disables. The Qc and Qd outputs are applied to a Nor-gate, whose output is the Field Identification enable pulse.

Chrominance Disable

Chrominance is disabled by the Field Blanking pulse, except during field identification time (lines 7—15). The Field Blanking signal enables U385C, an Exclusive Or-gate. At line 7, U366D is enabled by the Field Identification pulse. U366D remains enabled until line 15. The resultant output of U366A will be a low from the start of field blanking to line 7, a high from line 7 to line 15, and a low from line 15 to line 23.

U365, another counter clocked by composite sync, will count up to line 23, then its Qd output goes high and terminates subcarrier blanking. This is necessary to start chrominance at the beginning of line 23 rather than at the end of field blanking, which occurs about 5 μ s later.

Blanking Gate

U241B is the Blanking Gate. Composite Blanking is formed by combining the Line and Field Blanking signals from U255.

Timing Logic

U235 is a 256 x 4 Programmable Read Only Memory (PROM) containing information to generate certain non-standard timing signals needed by other circuits. U248 is its latch flip-flop, clocked by the Sync Generator phase-one 5 MHz clock.

U363A is a D-type flip-flop used to control the point at which the test signal changes to make up the SPLIT FIELD SIGNAL.

DIAGRAM 6 PULSE OUTPUT AMPLIFIERS

The purpose of the pulse output circuitry is to shape and amplify TTL pulses to usable amplitudes for television.

Pulse Amplifiers

The circuits on this diagram accept signals from the sync circuit and drive loads connected to the 143 front- and rear-panel connectors. Each integrated circuit contains two completely independent amplifiers, with rise- and fall-times controlled by external timing capacitors, labeled "Risetime".

The output level of each amplifier is adjustable by selecting the position of jumper P606. Signals are negative-going from ground, 1, 2, or 4 V peak-to-peak (terminated in 75 ohms), dependent on the position of P606.

FoB/FoR Out

TTL inputs from the Reference Oscillator at the D'B and D'R subcarrier-rate drive Q589 and Q608. These transistors act as a buffer and clipper to drive Q579 and Q618. Q579 and Q618 pulse the tank circuits every cycle. Each tank is tuned to its particular frequency. Q569 and Q619 are emitter-followers to drive the front-panel FoB and FoR outputs.

DIAGRAM 7 RGB

The RGB circuit contains a counter whose outputs determine the RGB signals that are applied to the RGB output amplifiers.

Counter and Logic

U678 is a presettable Up/down counter wired to count down. During composite sync time, the hard wired data (count 7) on U678's A, B, C, and D inputs is loaded into the counter. The clock input then advances the counter, causing the outputs to count down to 0. The clock input is timed so that the count-down rate corresponds to the RGB signal. When the count down reaches 0, the max/min output goes high, disabling the counter until the next pulse loads in a new count.

The counter output is gated with Field Blanking to prevent RGB output during the vertical interval.

The white bar is detected by looking at the counter outputs and sensing when they are all high.

Current Switches and Output Amplifiers

Each amplifier has a current switch that is gated on and off by the individual RGB drive for that amplifier. The white bar is also gated in the same way. Sync is added only through the G amplifier.

Current switch outputs are filtered and summed at the amplifier output. The amplifier is capable of driving one 75-ohm load.

DIAGRAM 8 CONVERGENCE

An astable multivibrator is used to control a monostable multivibrator that produces a series of pulses each line. The pulses combine to form vertical lines and dots on the convergence display.

Logic Drive and Filter

Timing signals from each block combine and control current-switches for the convergence and sync portions of the composite output signal.

Bandpass filters determine the risetimes and shapes of signals from the drive stage. Their outputs are added and amplified in the final stage.

Horizontal Position and Timing

The leading edge of horizontal blanking triggers U788B. The HORIZONTAL POSITION control determines the delay time of U788B, which then enables an astable multivibrator, U786A & B. The HORIZONTAL POSITION control determines the horizontal position of the convergence display on monitor.

U786's oscillation frequency depends on the current through R775 (frequency is approximately 315 kHz) or the parallel combination of R775 and R765 (for a frequency of approximately 630 kHz), depending on the condition of Q762.

U786's output frequency is halved by U801B and applied to the line-pulse and dot-pulse generator, U781A and B.

Vertical Position and Timing

A binary counter, clocked at 2X line rate, drives a Programmable Read Only Memory (PROM) causing its outputs to go high during lines on which horizontal lines or dots appear.

U788A operates similarly to U788B, but at the vertical rate. U788A clears counter U842 from the start of field blanking until a time set by the VERTICAL POSITION control.

When U842's clear inputs go low, U842 counts to a number set by U841's programming, resets to 0, and then repeats through the field at a line rate. U841 is a Programmable Read Only Memory (PROM). U841's function is to set its outputs high at a particular address (count) from U842. These outputs correspond to horizontal lines and dots that occur on a monitor. U841 also supplies a counter reset to U842 to restart the line and dot sequence.

U841 has two inputs not directly related to the counter, U842. Pin 15 determines the sequence of lines, dots, and reset for both sizes of the crosshatch pattern. When pin 15 is high, the large squares are selected, when low, the small squares are selected. Pin 1 is the field sequence timing. U782A & B determine the proper field-rate polarity to U841 from the VERTICAL POSITION control and the counter (U842).

U822 latches the PROM output to ensure a correct output from U841. The A input and associated Qa output of U822 functions only to invert the Crosshatch Vertical control line.

Logic Drive, Filters, and Output Amplifier

The pattern size is determined by P852. With the jumper on pins 1 & 2, Q789, Q779, and Q762 turn on increasing the current into U788A & B and U786B. This increase in current changes the horizontal and vertical positioning ranges (U788A & B) and the number of vertical lines and dots appearing on the crt of the monitor (U786). Notice that U841 also senses the pattern size control line.

Horizontal and vertical dot timing is combined in U821C. Horizontal line timing is added to vertical line timing by U802C and added to the dot pattern in U821B. Composite blanking is inverted by U810A and added to the line and dot pattern in U802A. This signal drives current switch Q804, which sets the pulse amplitude.

Q794 adds sync to the signal. Q794 and Q804 are off during sync time.

Current switch outputs are filtered and summed at the amplifier input. The amplifier is capable of driving two 75-ohm loads.

DIAGRAM 9 COLOR BAR LOGIC

The color bar logic board generates currents proportional to the luminance signal that drives the output amplifier on the video output board.

In addition, currents that are proportional to the color difference signals are generated. These currents go to the modulator to modulate the subcarrier.

Color Bar Timing

The color bar clock signal from the Sync Generator and Timing Logic (diagram 5) drives counter U868. Each state of the counter corresponds to a different color bar location.

| Counter state | Color Bar time slot |
|---------------|---------------------|
| 0-5 | not used |
| 6 | line burst |
| 7 | white |
| 8 | yellow |
| 9 | cyan |
| 10 | green |
| 11 | magenta |
| 12 | red |
| 13 | blue |
| 14 | black |
| 15 | line blanking |

The counter is reset to 6 at the end of every line by the line drive signal, LD.

Chrominance Current Generator

The binary coded decimal (BCD) output of the counter is converted to the proper RGB chrominance combination by the program stored in U888.

| Output pin U888 | Drive signal | |
|-----------------|--------------|----------------|
| | D'R line | D'B line |
| 12 | G | \overline{G} |
| 11 | R | \overline{R} |
| 10 | B | \overline{B} |

VCB through R945A-G are the current sources that are switched to provide chrominance current to the Video Output. Actual switching is accomplished by transistor pairs and diodes (i.e., Q919-Q939-CR919 for \overline{G}).

Pre-Emphasis

U978 directs the current to either a pre-emphasis circuit or to a flat response network, based on the position of the front panel PRE-EMPHASIS switch. Q1015 buffers the output current and provides a high output impedance. The emitter voltage of Q1015 is varied by U985, as a function of the color bar amplitude, to maintain a constant white bar output current. This keeps the modulator input circuits within their active regions.

Field ID Generator

During the field identification interval, U1055 generates ramps that are positive going on D'R lines and negative going for D'B lines (lines 7—15 and 320—328). The ramps are reset by Q1053, which is driven by the ID Enable signal. During the active line, U1034 is switched to allow the ramp current to pass to the buffer stage, Q1015. During horizontal blanking, U1034 connects a constant current to the buffer stage. R1023, R1032, and C1023 provide pre-emphasis for the ID signals.

Luminance Current Generator

The BCD output of counter U868 is converted to the proper luminance-RGB combination by the program stored in U884. U894 latches the output of U884 to avoid extraneous aberrations and provides blanking of the luminance signal as required.

Chrominance and luminance transitions of the composite signal are made to occur at the same time by delaying the luminance clocking signal in U864B. The proper timing is set by adjusting R866.

| U884 Output | Drive Signal |
|-------------|--------------|
| pin 12 | G |
| pin 11 | R |
| pin 10 | B |
| pin 9 | 100% white |

G, R, and B are logic 0 when 100% white is a logic 1.

Q912, Q913, Q914, and Q923, with the last four sections of R945 are current sources that are added together to yield a current proportional to the luminance signal. R912 and R913, a current divider, provides a current equal to 1/3 of the total to the Video Output Amplifier (diagram 12).

U886 has control when and if, a pattern other than color bars is generated in the luminance and chrominance channels. It combines the 3/4 field logic signal with the control signals from the front-panel WAVEFORM switch. The actual pattern is selected by the position of jumpers at P866 and P876. The patterns available are:

| P866 | P876 | Pattern |
|------|------|---------------------------|
| +5 V | +5 V | full field white |
| +5 V | Gnd | phase sequence color bars |
| Gnd | +5 V | yellow-red-yellow bars |
| Gnd | Gnd | reversed color bars |

Front Panel Switch Logic

U882 is a read-only memory which combines the control signals from the CHROMA SEQUENCE, D'B, D'R and IDENT front-panel switches with the D'B and FB logic signals. Its outputs control the necessary circuits to implement these front-panel functions.

Color Bar Amplitude

The Color Bar Amplitude is controlled by front-panel switching, a voltage divider, and a voltage follower. Its output is the VCB used by the Chrominance and Luminance Current Generators.

The following two diagrams contain the circuitry for the modulator. Although the circuitry is divided into two diagrams, it is not possible to discuss the general aspects of the modulator in terms of two separate blocks of circuitry.

The modulator contains the VCO, clipper, bandpass filter, and D'B subcarrier offset. The current drive from the Color Bar Logic circuit is clipped before it drives the VCO. The VCO is phase locked, during the line burst, to the FoB and FoR reference frequencies, as appropriate.

DIAGRAM 10 CLIPPER and VCO

D'B Offset & Filter

Signal current from the Color Bar Logic Circuitry is summed at the junction of Q1333, Q1312, Q1313, and CR1295. Q1333 is a constant-current source. The current from Q1312 into the summing junction is determined by the voltage supplied to its base from the clamp circuit (Q1282, U1202C, & U1197D). CR1295 supplies an offset current to the summing junction to offset the voltage to the VCO during D'B lines.

D'B +5 V Reference

U1297B, Q1305, and Q1306 are used to set a very accurate current through R1305. R1267 and R1278 form a voltage divider to set the voltage at U1297B (pin 5) at 5 volts. The characteristics of a linear feedback amplifier, such as U1297B, forces pin 6 to also be at 5 volts. The voltage across R1305, and therefore the current through it, is constant. This is the D'B offset current.

CR1285 and CR1295 are steering diodes used to switch the D'B offset current into the summing junction (CR1295, Q1333, Q1312, & Q1313) or a dummy load, R1285. The steering diodes are controlled by Q1265, which translates the TTL signal at its base to the voltages required to operate the steering diodes. The signal at the base of Q1265 is a square wave, low during D'R lines (current to dummy load) and high for D'B lines (current to summing junction).

Q1313 applies the resultant summing current to the chrominance low-pass filter.

L1335, L1336, and L1337 are part of a low-pass filter used to limit the bandwidth of the pre-emphasized color bar signal.

Clipper

The clipper consists of Q1236, Q1237, Q1238, Q1289, Q1299, and Q1309. It operates on the chrominance current from the low-pass filter. If the chrominance current exceeds a preset value, Q1238 (limiting high-frequency excursions) or Q1236 (limiting low-frequency excursions), becomes current starved, limiting the VCO input voltage at TP1236.

Q1309 is a constant-current source. Q1299 drives another constant-current source (Q1289) and the high frequency limiter, Q1238. CR1249 prevents the emitter-base junction of Q1238 from becoming excessively reverse-biased, when it is current starved. The output of Q1238 is applied to a current source, Q1237 and the low-frequency limiter, Q1236. Q1236 is current starved during low-frequency excursions, which allows no output current. CR1236 serves the same purpose for Q1236, as CR1249 does for Q1238.

The net result of the clipping action is that Q1236 limits the VCO drive, and consequently the output frequency, to 3.9 MHz for low-frequency excursions. Q1238 limits the VCO drive, and consequently the output frequency, to 4.756 MHz for the high-frequency excursions.

R1258 sets the high-frequency clipping limit.

Gated Feedback Amplifier

The output of the clipper supplies a current that is sampled and fed back to the filter input driver. This feedback circuit forces the output of the clipper to be at a fixed level, determined by R1195, during the D'R line burst, over a wide range of temperature and component variations.

U1197D, a buffer amplifier, drives U1202C, the gating amplifier. During the D'R line burst time, Q1142 is driven by a level that causes its collector to gate on U1202C, charging C1283. Q1282 serves as a high input-impedance buffer to drive Q1312 for the offset current into the filter driver. The output level of the clipper during the D'R line burst time is determined by the reference voltage on the minus input of U1202C. R1195 sets the low-frequency clipping level.

VCO

The VCO has a linear relationship between the input voltage and the output frequency. This relationship holds true due to the addition of a gain control to compensate for the increased storage time of the oscillator transistors at higher frequencies. The VCO is also shut off at the end of each horizontal line, and turned on again at a point that forces the subcarrier phase to be correct. A frequency control loop is provided to lock the oscillator to the correct subcarrier frequency during line blanking. Differential outputs drive a comparator, giving a TTL level signal at the appropriate color bar frequency.

Voltage divider, R1135 & R1134, amplifier U1145 & U1147C form a stable voltage source for the VCO. The voltage at the emitter of U1147C is near +10 volts.

Transistor array U1197A, B, C, U1167A, B, E, U1147A, D, E are the VCO.

The current through U1197B and C, the value of C1127, and the voltage on the bases of U1167A and E determine the fundamental frequency of oscillation (see Fig. 7-1).

Assuming U1167E conducts during the first half-cycle, current flows through U1197B, charging C1127 negative at the emitter of U1167A. This charging continues until U1167A turns on. The turn-on voltage for U1167A is determined by the voltage at the base of U1167B and the voltage divider, R1168 & R1178. The voltage at the base of U1167B is set by the base voltage at U1147D, which is turned on by the current through R1167. The current through R1167 comes from the current source, U1197A & U1167E. At the point where U1167A conducts, (the second half-cycle), currents from U1197B and C switch. U1167E turns off and U1197A turns on due to the current through R1157 increasing rapidly (U1167A turning on), forcing U1147A and U1167E to move more negative and shutting U1167E off.

The rate these switches occur is variable by changing the current through U1197A or U1197B & C. The gain of the VCO is modified by the current through U1197A. This allows compensation of the higher frequencies to make up

for storage time of the switching transistors. The current through U1197B & C is dependent on the color bar drive signal from the clipper. The color bar input is modified by currents through R1205 & R1209 that force the VCO to oscillate at the FoR and FoB frequencies during line burst interval.

The output of the VCO (emitters of U1167B and U1147A) is applied differentially to the two inputs of high-speed comparator, U1109. The output of U1109 is a TTL signal at the subcarrier frequency, used to drive the subcarrier circuits on the video output circuit board. The front-panel SUBCARRIER OFF switch turns the Comparator, U1109, off.

DIAGRAM 11 VCO CONTROL

Circuits on this diagram compare the VCO and the reference frequencies and process the difference signal to correct the VCO frequency.

Frequency Comparator

U1076B is a phase comparator, whose output shows the relationship between the reference frequency and the VCO output. This difference output is filtered by R1085 and C1075, showing the phase difference between the two inputs. This difference signal, found at TP1075, gives an indication of the performance of the VCO during the complete line time.

Logic Timing

U1077 is a counter that is enabled by a horizontal gate and clocked by the reference frequency. The outputs of the counter drive U1073B to stop the VCO for about 3 counts and gate the phase difference signal during line burst time (U1076B and D, U1074B, and U1072).

Line Burst Sample and Hold

Q1140 drives a low-pass filter that is used to convert the difference signal (VCO out and Reference in) to a dc level during line burst. This level is sampled by U1241 to charge C1261. Q1251 and U1280 buffer the voltage on C1261. A line-by-line difference in dc level will show up at TP1281 if the line burst frequency of the VCO differs from the reference frequency. This line-by-line difference modifies the input current of the VCO to force the VCO to the reference frequency during line burst time. This current change is through Q1254, Q1215 and R1205-R1209 (diagram 10).

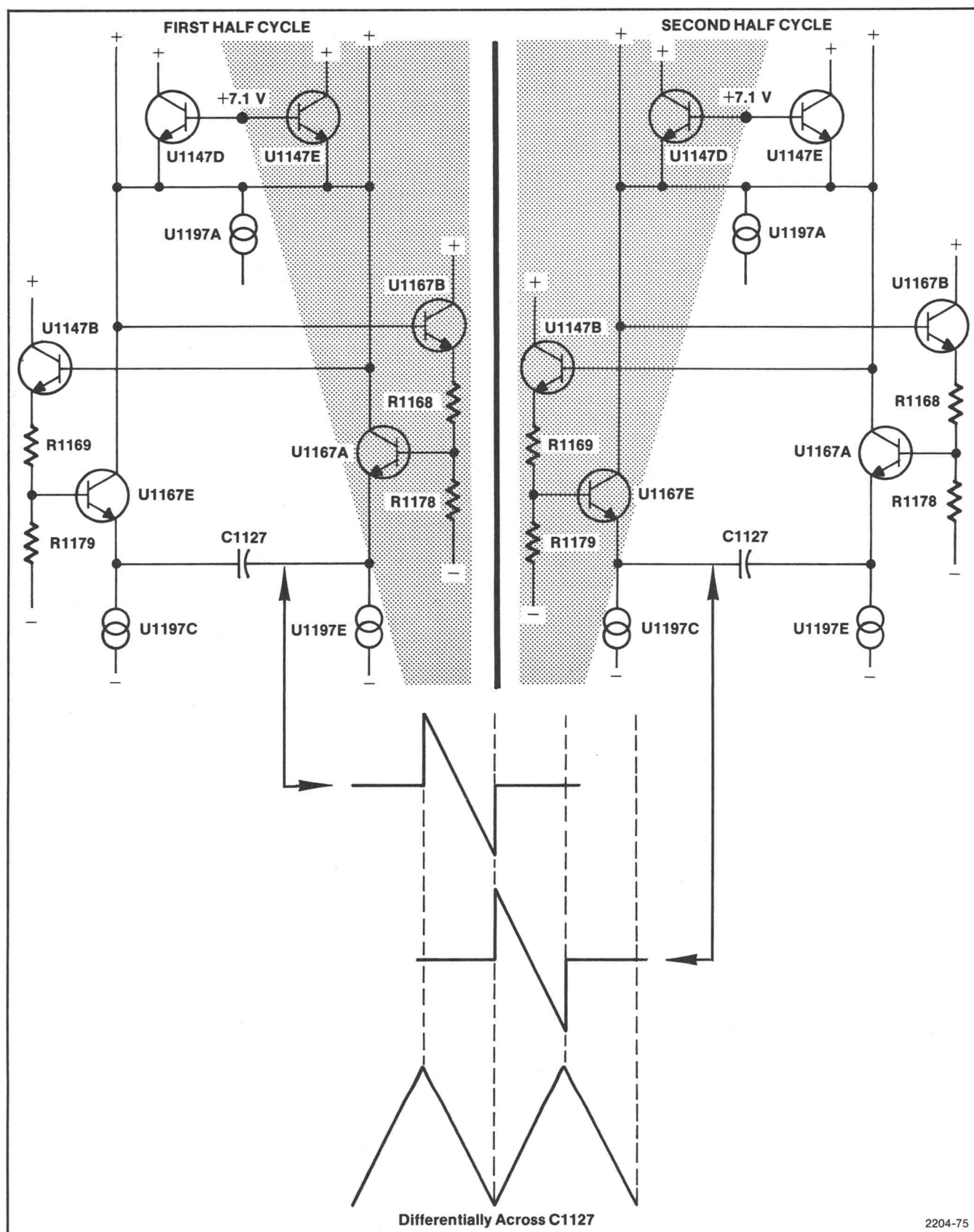


Fig. 7-1. Idealized operation of the VCO.

D'R/D'B Line Gate

U1073A supplies a positive-going pulse during the D'R lines. U1074A & D provides a positive-going pulse during D'B lines. The positive-going pulse from U1073A & Q1132 turns on U1202B during the D'R lines, grounding C1271. During D'B lines, the output of U1202B goes to a high-impedance state and U1202A is turned on, allowing the voltage of C1271 to be transferred to the input of the rate-limited amplifier U1222. The output of U1222 passes through analog switch U1252 to the gain control of the VCO.

The gain control of the VCO is set by the current through R1208, Q1205, Q1244 (diagram 10) and the output of the analog switch, U1252. The current through R1208 is determined by the clipper input (at higher frequencies, less current, so the VCO switches faster).

VCO Gain Switch

The current through Q1205, Q1244 (diagram 10) and U1222 is an offset current to the VCO to correct for long-term drift, again by offsetting the switching points of the VCO.

In the ALL LINES SAME mode of operation, the VCO gain is determined by the current through R1282, one of the inputs of U1252. U1252 switches between the current from U1222 and the constant current from R1282.

DIAGRAM 12 VIDEO OUTPUT

The video output circuits process the subcarrier and add it to the luminance and sync signals, forming the composite video signal.

Input Stage

U1352 is a comparator used to shape incoming subcarrier into square waves. R1351 is adjusted to make the signal exactly square by changing the comparison level. The even harmonics are nearly eliminated from the output signal as a result of using square waves. Q1372 and Q1392 are current sources which are switched on and off by the output of U1352.

Bell Filter

The current generated by Q1372 is modified by the Bell Filter, consisting of: L1403, C1403, C1408, R1403, and R1383. U1412 acts as a switch to conduct either the Bell Filter modified current, from Q1372, or the constant-amplitude current, from Q1392. U1412 is controlled by the front-panel BELL FILTER switch.

Blanking Stage

Q1387 is a 130 μ A current-source that is switched on and off by the blanking signal. Q1415 is a 65 μ A current-sink. The algebraic sum of these currents is used to charge or discharge C1387, generating a ramp when the subcarrier is to be turned on or off. This ramp causes U1417 to turn on or off gradually, resulting in rise-and fall-times of about 400 ns for the subcarrier envelope. Q1426 provides a low-impedance variable voltage point, at its emitter, that is controlled by R1425. Adjusting R1425 reduces the transients generated at the blanking edges.

5X Buffer

This stage is a times-five current amplifier where the change is the collector current of Q1458 is five times the change in current at pin 9 of U1417.

Bandpass Filter

The bandpass filter removes harmonics of the subcarrier fundamental frequencies and any sidebands of the chrominance signal that could extend into the luminance channel. The 3 dB points of the filter are 2.45 MHz and 6.00 MHz.

CR1506 and CR1516 are in a current-splitting configuration, used to vary the subcarrier amplitude. Q1503 is a variable current source that controls the current through CR1506. The ac subcarrier signal is split between the two diodes in the same proportion that the dc current supplied by R1507 is split between them.

Output Amplifier

This circuit is an inverting operational amplifier with variable DC Level, R1554, and Video Gain, R1556, controls. The amplifier drives two 75-ohm external loads, front-and rear-panel COMPOSITE VIDEO outputs.

Luminance Input

Q1561 provides a low-impedance termination for the luminance current, from the color bar logic board. The luminance filter provides 100 ns risetimes for all luminance changes.

R1554 sets the blanking level of the composite video signal.

Sync Input

U1481 provides the delete-sync function, controlled by the front-panel SYNC switch. The sync filter provides 200 ns risetimes on the sync edges.

Section 8

MAINTENANCE

This section covers troubleshooting, repair procedures, parts replacement, and ordering information to facilitate prompt repairs. In addition, preventive maintenance information is also presented in this section.

TROUBLESHOOTING

This instruction manual contains several troubleshooting aids; such as: component diagrams, waveform photos, block diagram, schematic diagrams, and the theory of operation (Section 7). They are intended to assist in the prompt isolation and repair of most possible failures.

OTHER TROUBLESHOOTING AIDS

Diagrams

The diagrams for the 143 are located in Section 10 of this manual. Included in that section are the individual Schematic Diagrams, numbered 1 through 12, the overall Block Diagram, Circuit Board Diagrams, and Parts Locating Charts.

Block Diagram. The purpose of the Block Diagram is to give a logical view of the interrelation of the circuits that comprise the 143. Note that logic symbols have been used as functions where they can be used; for example, amplifier circuits are depicted by triangles.

Schematic Diagrams. The circuit diagrams are on foldout pages in Section 10. Circuit identification numbers and the electrical value of components are shown on the diagrams, along with the important waveforms.

Each Schematic Diagram is double blocked, once for the etched circuit board that it represents (a bold black line) and for each of the individual circuits it contains (a lighter gray line). Each of the circuit blocks is identified by a label consisting of a barber pole stripe with the circuit name on it. The name of each etched-circuit board is placed in the board outline, usually at one of the lower corners of the diagram.

Circuit Board Diagrams. Because each circuit board concentrates a large number of parts in a small area, it is essential that a method of parts locating accompany the boards. Special diagrams, that are accurate representations of the circuit boards, have been developed. Each component on the circuit board is identified by its easily recognizable shape and individual part number. Note also that these diagrams contain the etched circuit runs for both front and rear of the circuit board. Diagrams are located on the back side of the preceding foldout and are listed on the reverse side of the indexing tabs.

Parts Locating Charts. At times it is necessary to locate a component on the schematic diagram. With the complexity of both the etched circuit board and the schematic diagram, this can become a difficult task. The addition of a numbering grid around the schematic and a related locating chart on the leader, or apron of the Schematic Diagram makes it easier to go from either the Parts List or the Etched Circuit Board to the Schematic Diagram to locate a specific part.

Theory of Operation. Section 7 of this manual contains the description of the electrical operation of the 143's circuits. It is divided into two parts; the overview which gives an insight into the overall operation of circuits and an individual circuit description.

The Circuit Description gives a detailed look at the operation of the individual circuits. It is divided by the Schematic Diagrams and sub-divided by the circuit names alluded to earlier. This type of division makes it possible to go directly to the description of the circuit in question without having to read through a lot of other material.

143 Basic Construction

The 143 is primarily made up of circuitry mounted on etched-circuit boards. Etched-circuit boards are interconnected by a system of cables and multi-pin connectors.

Etched Circuit Boards

All of the circuit boards, except the Oven circuit board, are rigidly mounted to the chassis on metal standoffs. Circuit boards may be easily removed by following the instructions for their removal that appear later in this section.

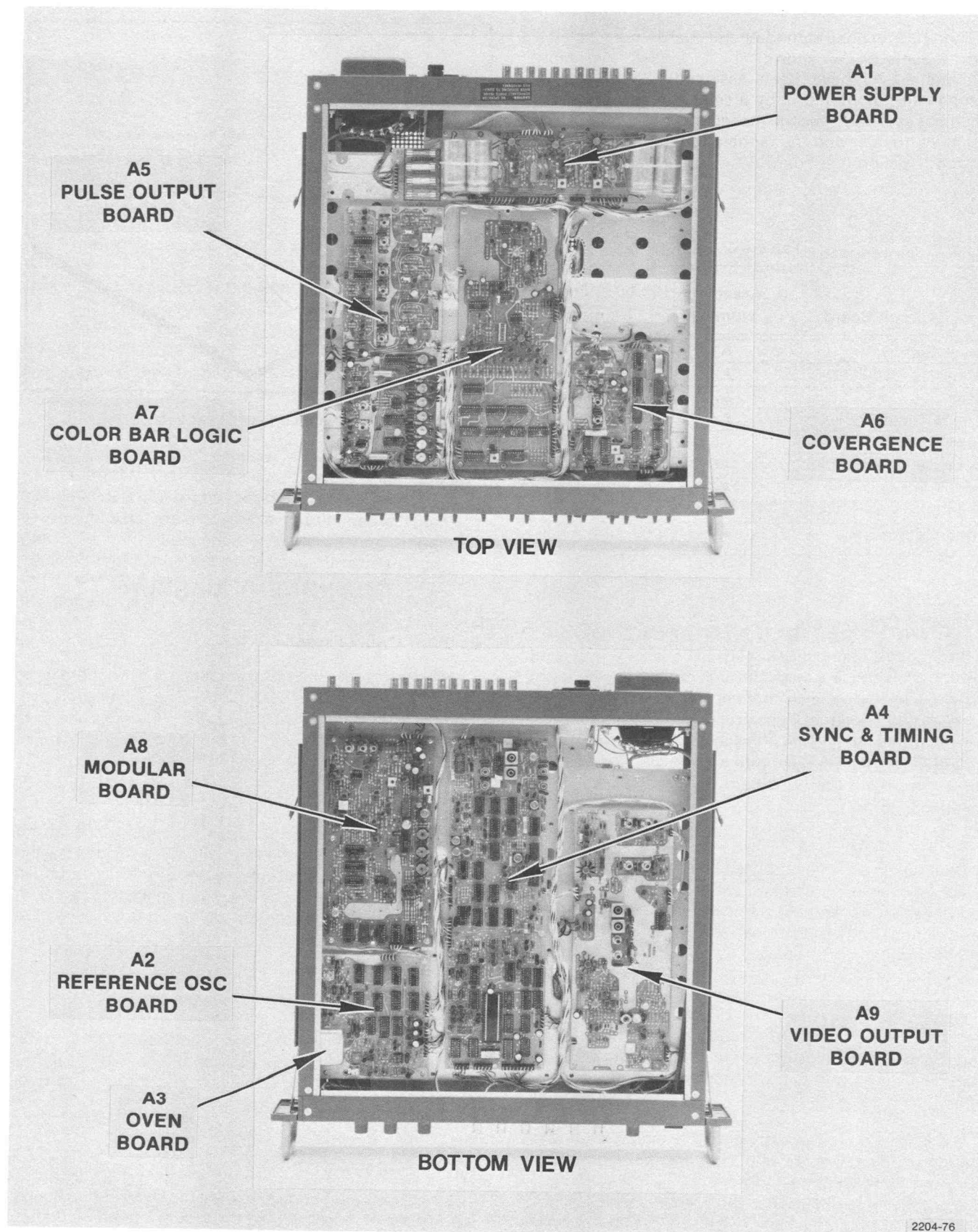


Fig. 8-1. Location of etched circuit boards (ECBs).

The 143 contains 9 etched-circuit boards, nomenclated and mounted as shown in Fig. 8-1. Assembly numbers A1-A9 have been assigned to the boards. Component numbering is by a serial circuit numbering scheme. Table 8-1 gives the etched circuit board's name, assembly number and the range of circuit numbers that are contained on that board.

Table 8-1

| Circuit Board | Assembly Number | Circuit Number Range |
|----------------------|-----------------|----------------------|
| Power Supply | A1 | 1 thru 79 |
| Reference Oscillator | A2 | 80 thru 229 |
| Oven | A3 | 118 thru 158 |
| Sync & Timing | A4 | 230 thru 559 |
| Pulse Output | A5 | 560 thru 759 |
| Crosshatch | A6 | 760 thru 859 |
| Color Bar Logic | A7 | 860 thru 1059 |
| Modulator | A8 | 1060 thru 1349 |
| Video Output | A9 | 1350 thru 1579 |

Multi-Pin Connectors

Inter-circuit connections, between circuit boards and power transistors, are made through cables and multi-pin connectors. The multi-pin connector holders have identification numbers from 2 upward, to identify the locations of leads within the holders. Pin 1 in both the holder and on the circuit board is denoted with a triangular shaped mark

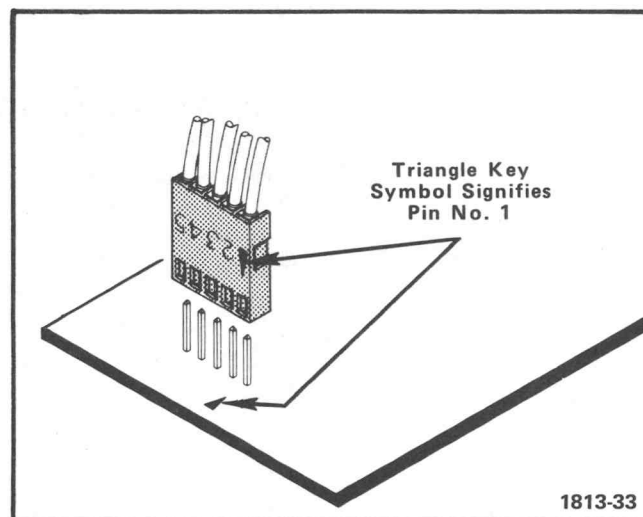


Fig. 8-2. Multi-pin circuit board connector.

to ensure proper plug to connector orientation. Fig. 8-2 shows how the multi-pin connectors are used.

COMPONENT MARKING

Resistor Color Code

Resistors used in the 143 are color coded in accordance with the EIA standard color code. The colored stripes denote value and tolerance. Fig. 8-3 illustrates the EIA Standard Color Code. Resistors without color coding have the value printed on the body of the resistor.

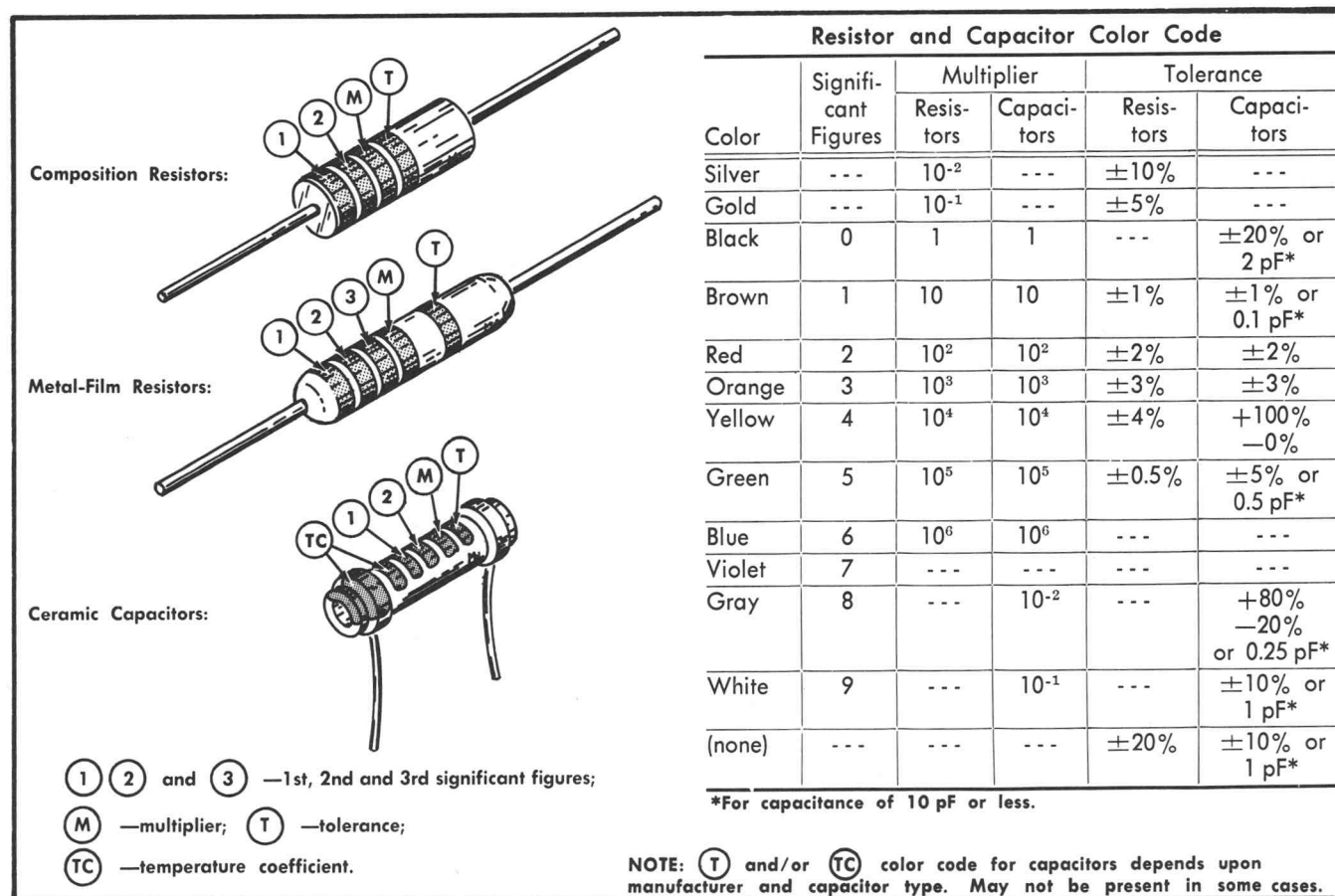


Fig. 8-3. Color code for resistors and ceramic capacitors.

Capacitor Markings

The capacitance of a small disc or electrolytic capacitor is marked on the capacitor body in microfarads. The ceramic tubular capacitors are marked with the EIA Standard Color Code; value is given in picofarads. See Fig. 8-3 for an illustration of this code.

Dipped Tantalum or tear-drop capacitors are color coded in microfarads, using a modified EIA Color Code. Note that the dot signifies both temperature and the positive (+) side, see Fig. 8-4.

Transistor and IC Lead Diagrams

Fig. 8-5 illustrates the lead configurations for the integrated circuits and transistors used in the 143.

Diode Polarity Markings

Fig. 8-6 illustrates the polarity of all the diodes that are used in the 143.

ROUTINE TEST OF COMPONENTS

It is unnecessary to routinely check the value of any of the components in this instrument. The best check on operation is the Performance Check portion of the procedure given in Section 6 of this manual.

Periodic transistor and integrated-circuit tests are not recommended. The best check of these devices is their operation in the instrument.

INSTRUMENT RECALIBRATION

The interval between calibrations depends on the amount of use the instrument receives, the nature of its environment, and changes in performance when components are replaced.

| Rated Voltage VDC 25°C | Color | CODE FOR CAPACITANCE IN PICOFARADS | | |
|---------------------------|--------|------------------------------------|------------|-------------------|
| | | 1st Figure | 2nd Figure | Multiplier—pF |
| 4 | Black | 0 | 0 | None |
| 6 | Brown | 1 | 1 | X 10 |
| 10 | Red | 2 | 2 | X 10 ² |
| 15 | Orange | 3 | 3 | X 10 ³ |
| 20 | Yellow | 4 | 4 | X 10 ⁴ |
| 25 | Green | 5 | 5 | X 10 ⁵ |
| 35 | Blue | 6 | 6 | X 10 ⁶ |
| 50 | Violet | 7 | 7 | X 10 ⁷ |
| | Gray | 8 | 8 | |
| 3 | White | 9 | 9 | |

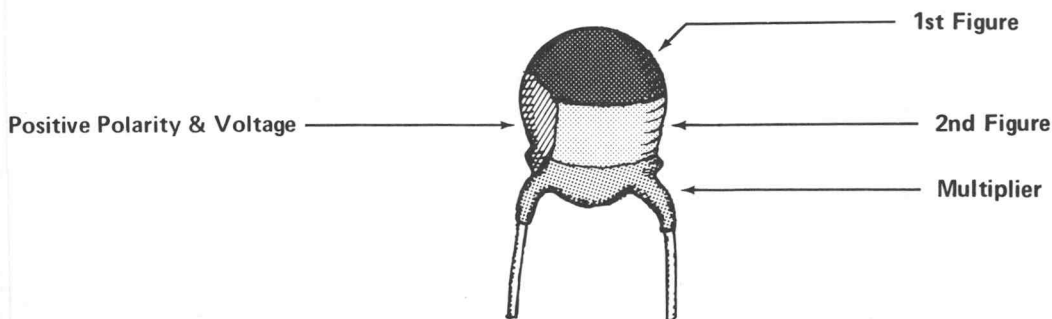


Fig. 8-4. Color coding for dipped tantalum "tear drop" capacitors.

In general, a partial readjustment is necessary if components replaced affect any part of the instrument's calibration. Complete readjustment is recommended if the instrument is not operating at its full capacity, or if power-supply repairs or adjustments have been made. To ensure accurate operation, instrument performance should be checked at regular intervals; for example, after 1000 hours of operation if used continuously, or at least every 6 months if used part time.

Performance of the 143 SECAM Test Signal Generator can be verified by the procedure contained in Section 6. The adjustment procedure is combined with the Performance Check.

PARTS REPLACEMENT

Special procedures are required to replace some of the components in this instrument. These procedures along with some general instructions for working on etched-circuit boards are covered in the following paragraphs.

Fuse Replacement

Both the primary and secondaries of the power transformer are fused. The primary fuse is accessible from the outside of the 143; the secondary fuses are not.

WARNING

Turn off power before replacing fuses.

CAUTION

Replace fuses only with the specified type and rating or instrument damage may result.

Primary Fuse Replacement. The primary fuse is located in a holder on the rear panel. It is accompanied by a fuse versus nominal mains voltage chart. Consult this chart for the correct replacement fuse.

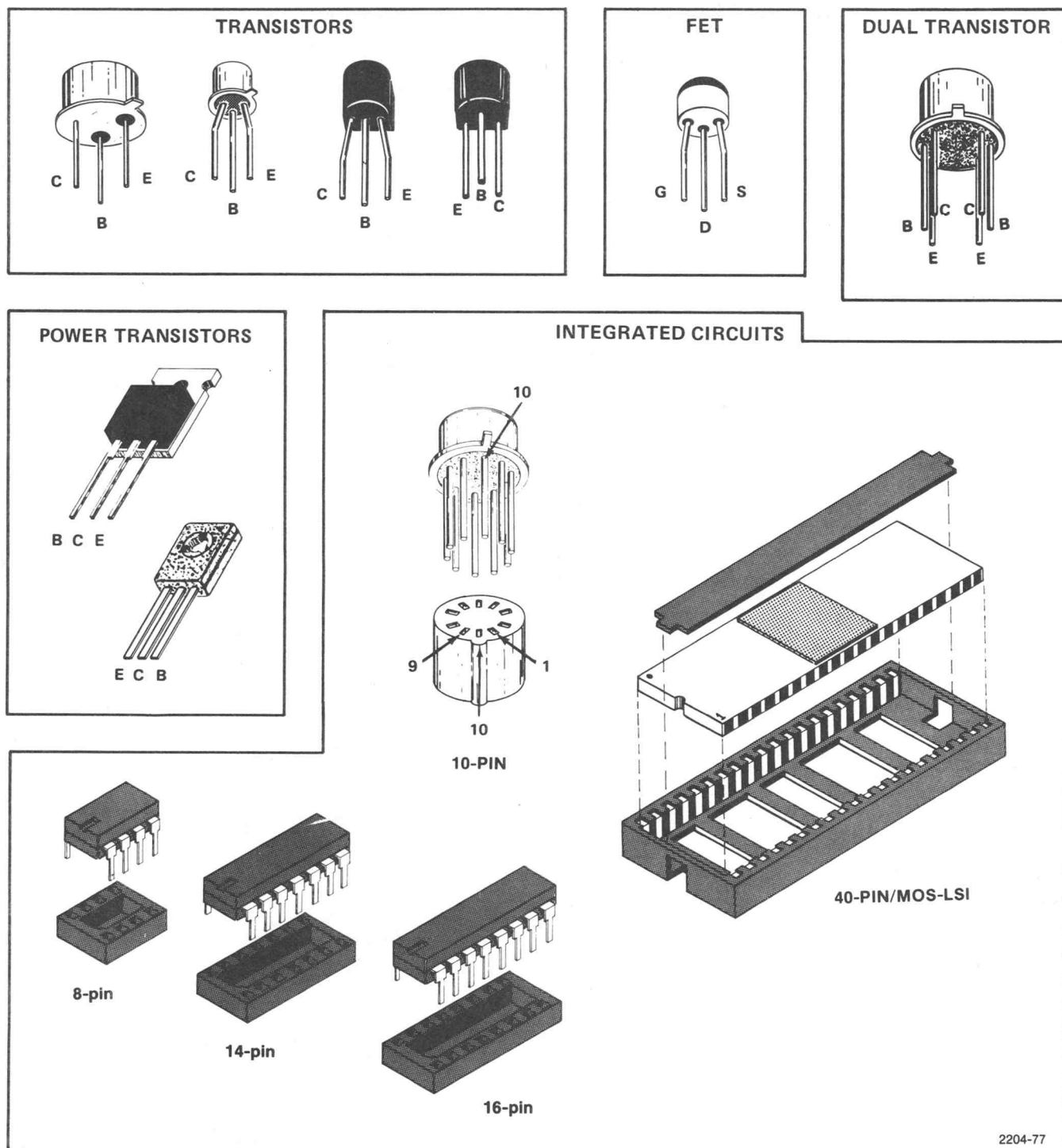


Fig. 8-5. Basing diagram for semiconductors.

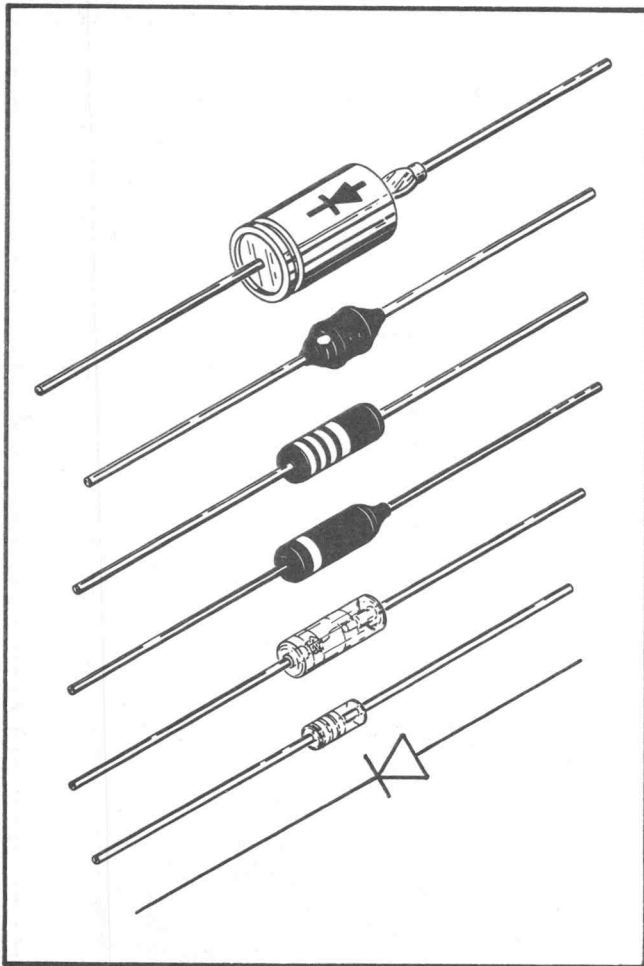


Fig. 8-6. Diode Polarity Markings.

Secondary Fuse Replacement. Secondary fuses are located on the Power Supply Circuit Board, A1, near the power transformer. To remove one of these fuses, slide it in one direction or the other until the end-bells are disengaged from the clips, then lift out.

Always replace with the specified rating and type.

To install the fuse in the clips, press the end-bells into the clips.

Soldering Techniques

WARNING

Disconnect the instrument from the power source before soldering.

Reliability and optimum performance of this instrument depend, in part, on careful repairs to its circuits. Proper soldering techniques should always be used if it becomes necessary to replace components within the instrument.

Use only 60/40 rosin-core solder and the proper size soldering iron to make repairs. A 15 to 25 watt pencil-type soldering iron should be used on the etched circuit boards. A higher wattage iron should be used on the heavier components, such as the power transformer or chassis ground lugs.

When working on the etched-circuit boards, avoid excessive heat. Excessive heat may separate the etched wiring material from the circuit board. Always keep the soldering iron well tinned and clean.

Clean off excessive solder.

After soldering is completed, clean the area around the solder joint with a flux remover solvent. Be careful not to remove any silk-screened information.

The exploded view drawings associated with the Replaceable Mechanical Parts list are helpful in the removal or disassembly of individual components and subassemblies. Circuit board locations are given in Fig. 8-6.

REMOVAL & REPLACEMENT

Etched Circuit Board Removal

Under some conditions, it may be necessary to remove an etched-circuit board. In the event removal becomes necessary, follow the simple procedure given here.

Chassis-Mounted Boards

1. Disconnect the multi-pin connectors from the board. Note the order of these connectors, so that they can be correctly replaced.

2. Remove the securing screws.

3. Remove the board.

To replace the board, reverse the order of removal. Match the triangular keys on the multi-pin connectors to those on the circuit board for proper alignment of plugs.

Oven Board

1. Remove the Reference Oscillator board (A2). Use the procedure for removing chassis-mounted boards.
2. Remove the two oven-securing nuts, located on the bottom of the Reference Oscillator board.
3. Pull Oven, Oven board, and insulating material straight off of the Reference Oscillator board. Use care not to bend the Oven board interconnecting pins. Oven board and insulating material may separate from the Oven can, in which case the Oven board and insulating material will have to be removed separately from the Reference Oscillator board. If this happens omit step 4.
4. Remove the Oven board and bottom insulating material from the Oven can.
5. Remove insulating material from the bottom of the Oven board.

To replace the Oven board and Oven assembly on the Reference Oscillator board, reverse the sequence.

Pin Connector Replacement

Circuit-board pins, end-lead pin connectors, and multi-pin connectors are used to interconnect the circuit boards and power transistors in this instrument.

Replacements. A circuit-board pin replacement kit, including necessary tools, instructions and replacement pins, is available from Tektronix, Inc. Order Tektronix Part Number 040-0542-00.

Semiconductor Replacement

Semiconductors should not be replaced unless they are actually defective.

CAUTION

Remove power before attempting to change any semiconductor.

If semiconductors are removed from their sockets during maintenance operations, return them to their original sockets. Unnecessary replacement of semiconductors may affect the calibration of this instrument. When semiconductors are replaced, check the operation of the portion of the instrument affected.

Replacement semiconductors should be of the original type or a direct replacement. Fig. 8-5 shows the lead configurations of the semiconductors used in this instrument. Some plastic-cased transistors have lead configurations that do not agree with those shown here. If a replacement transistor is made by a manufacturer other than the original, check the manufacturer's basing diagram for the correct basing. All transistor sockets in this instrument are wired for the standard basing used for metal-case transistors. Power transistors, that are mounted on the chassis, use thermal conducting grease to increase heat transfer. Replace thermal conducting grease when replacing these transistors.

WARNING

Handle thermal conducting grease with care. Avoid getting in eyes, wash hands thoroughly after use.

Lamp Removal.

The front-panel indicator lamps are held in place by a retainer ring on the rear of the socket. To replace a lamp, unplug the connector and pry up on the rear of the lamp bulb and pull straight back.

To replace, reverse the process.

Switch Removal.

LEVER SWITCHES. Cut bus wire, if necessary, as close to the switch contacts as possible. Unsolder wires to the switch contacts. Remove the knob by pulling straight off the switch shaft.

It may be necessary to remove an etched-circuit board to get to the switch mounting nuts. If so, follow the instructions for removing chassis-mounted etched-circuit boards.

Use a 3/16 inch nut driver to remove the switch mounting nuts. The switch should come right out. Be careful not to damage adjacent switches.

To install a lever switch, first mount the switch and then resolder the wires to it. Use the minimum amount of solder required, so as not to flood the contact area of the switch. Use a short piece of number 22 wire to repair the cut bus wire. Reinstall the knob on the shaft.

WARNING

Disconnect the 143 from the power mains before working on the power switch.

POWER SWITCH. Unsolder the wires to the power switch. Be sure to note the location of the wires. Use a small screwdriver or soldering aid to apply inward pressure on the switch mounting-clips. There are two clips on the top of the switch and two on the bottom. While pushing in on the clips on one side of the switch, push the switch body forward on that side. Then, depress the clips on the remaining side of the switch and press forward to slide the switch out.

To install, slide the switch straight through the front panel. Make sure the mounting clips are engaged.

Resolder the wires to the switch.

Front-Panel Control Removal

Remove the knob with a 1/16 inch Allen wrench. Unsolder the leads from the control. Remove the mounting nut with a 3/8 inch nut driver. Remove the control and save the hardware.

Reverse the procedure to mount a new control.

Coaxial-Cable Connector Removal

Unsolder the lead from the coaxial connector. Remove the mounting nut, using a 1/2 inch nut driver. Do not lose the lock washer. Remove the connector.

To install a new connector, reverse the order.

Power Transformer Removal

WARNING

Disconnect the instrument from mains before attempting to work on the power transformer.

It is necessary to remove the rear-panel assembly of the 143 to remove the power transformer. Use the following procedure to remove the transformer.

1. Unsolder all connections from the transformer, tag all leads or draw a lead connection diagram. Be sure to unsolder the shield lead from the chassis ground lug.
2. Remove the 3 pan head screws (PHS) that secure the central chassis to the rear-panel assembly.

3. Remove the 6 flat head screws (FHS) that fasten the side rails to the rear-panel assembly.
4. Slip the rear-panel assembly free from the side rails. The rear-panel assembly only needs to move about an inch to allow removal of the power transformer.
5. Use a 3/8 inch nut driver to remove the 4 transformer mounting nuts. Be careful not to lose any mounting hardware.
6. Remove the transformer.

To reinstall a power transformer, reverse the procedure.

Removing Mains Socket & Line Filter

WARNING

Disconnect the instrument from the mains supply before attempting to work on the socket.

Remove the protective cover from the line filter. Unsolder the leads. Remove the mounting screws and remove the socket and filter assembly.

Reverse the procedure to reinstall the socket and filter assembly.

REPLACEMENT PARTS

All replacement parts for the 143 may be obtained through Tektronix, Inc. Field Offices or representatives. Many of the standard electronic components used in this instrument should be available locally. This source of supply should be considered before ordering from Tektronix, Inc. to reduce the required time to repair the 143. Check the list of Replaceable Electrical Parts for a complete description of the part before ordering.

Some of the components used in Tektronix instruments are designated as special parts. These components are selected by, or manufactured by Tektronix, Inc., to meet specific performance requirements. Special components are identified in the list of Replaceable Electrical Parts by a note in the column headed "Description".

Ordering Replacement Parts

When ordering replacement parts from Tektronix, Inc., please include the following information:

1. Instrument type.
2. Instrument serial number.
3. The circuit number and description of the part, as they appear in the list of Replaceable Electrical Parts (or Mechanical Parts).
4. The Tektronix part number.

Mechanical Parts

Information required for replacing or ordering mechanical parts can be found in Section 11 (Exploded View Drawing) and list of Replaceable Mechanical Parts.

PREVENTIVE MAINTENANCE

To continue to receive optimum performance for any precision equipment, a certain amount of attention must be paid to routine inspection and cleaning. Generally, the severity of the environment will dictate the frequency of recalibration, cleaning, lubrication, and inspection.

Cleaning

In addition to the appearance considerations, dust accumulation inside the 143 may cause serious damage. The best method to remove dust from the interior of this instrument is to first use low-velocity air to blow away accumulations. Then, after as much dust as possible has been removed, a soft cloth dampened with a solution of mild detergent and water, a paint brush, and cotton swabs can be used to remove the remaining dirt. Do not use harsh detergents or solvents that dissolve plastics to clean this instrument. Use water sparingly.

WARNING

Be sure that the instrument is disconnected from mains supply before attempting to clean.

CAUTION

Avoid the use of chemicals that contain benzene, toluene, xylene, or similar solvents.

Visual Inspection

Periodic visual inspection of this instrument will turn up many minor problems, that could, if ignored, become major. Particular attention should be placed on multi-pin connectors, semiconductor leads and sockets, and any apparent heat damage. Most remedies are obvious; however, heat damage may indicate additional trouble and should be investigated.

Lubrication

The reliability of potentiometers, switches, and other moving parts can be maintained if they are properly lubricated. Use a cleaning-type lubricant on switch contacts and a heavier grease on switch detents. Lubricate non-sealed potentiometers with a lubricant that will not affect their electrical characteristics. Do not over lubricate.

INSTRUMENT REPACKAGING

The original shipping carton provides maximum protection during shipment. If reshipment is necessary, repackaging in the original carton will minimize the danger of damage in transit. A repackaging illustration, provided in Section 1, shows how to repackage this instrument.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

| | | | |
|--------|----------------------|----------|-----------------|
| ACTR | ACTUATOR | PLSTC | PLASTIC |
| ASSY | ASSEMBLY | QTZ | QUARTZ |
| CAP | CAPACITOR | RECP | RECEPTACLE |
| CER | CERAMIC | RES | RESISTOR |
| CKT | CIRCUIT | RF | RADIO FREQUENCY |
| COMP | COMPOSITION | SEL | SELECTED |
| CONN | CONNECTOR | SEMICOND | SEMICONDUCTOR |
| ELCTLT | ELECTROLYTIC | SENS | SENSITIVE |
| ELEC | ELECTRICAL | VAR | VARIABLE |
| INCAND | INCANDESCENT | WW | WIREWOUND |
| LED | LIGHT EMITTING DIODE | XFMR | TRANSFORMER |
| NONWIR | NON WIREWOUND | XTAL | CRYSTAL |

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

| Mfr. Code | Manufacturer | Address | City, State, Zip |
|-----------|---|---|-------------------------|
| 00853 | SANGAMO ELECTRIC CO., S. CAROLINA DIV. | P O BOX 128 | PICKENS, SC 29671 |
| 01002 | GENERAL ELECTRIC COMPANY, INDUSTRIAL AND POWER CAPACITOR PRODUCTS DEPARTMENT | JOHN STREET | HUDSON FALLS, NY 12839 |
| 01121 | ALLEN-BRADLEY COMPANY | 1201 2ND STREET SOUTH | MILWAUKEE, WI 53204 |
| 01295 | TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP | P O BOX 5012, 13500 N CENTRAL EXPRESSWAY | DALLAS, TX 75222 |
| 02735 | RCA CORPORATION, SOLID STATE DIVISION | ROUTE 202 | SOMERVILLE, NY 08876 |
| 02777 | HOPKINS ENGINEERING COMPANY | 12900 FOOTHILL BLVD. | SAN FERNANDO, CA 91342 |
| 04009 | ARROW-HART, INC. | 103 HAWTHORNE STREET | HARTFORD, CT 06106 |
| 04222 | AVX CERAMICS, DIVISION OF AVX CORP. | P O BOX 867, 19TH AVE. SOUTH | MYRTLE BEACH, SC 29577 |
| 04713 | MOTOROLA, INC., SEMICONDUCTOR PROD. DIV. | 5005 E MCDOWELL RD, PO BOX 20923 | PHOENIX, AZ 85036 |
| 07263 | FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP. | 464 ELLIS STREET | MOUNTAIN VIEW, CA 94042 |
| 11237 | CTS KEENE, INC. | 3230 RIVERSIDE AVE. | PASO ROBLES, CA 93446 |
| 12954 | SIEMENS CORPORATION, COMPONENTS GROUP | 8700 E THOMAS RD, P O BOX 1390 | SCOTTSDALE, AZ 85252 |
| 14752 | ELECTRO CUBE INC. | 1710 S. DEL MAR AVE. | SAN GABRIEL, CA 91776 |
| 15801 | FENWAL ELECTRONICS, DIV. OF KIDDE WALTER AND CO., INC. | 63 FOUNTAIN ST. | FRAMINGHAM, MA 01701 |
| 24546 | CORNING GLASS WORKS, ELECTRONIC COMPONENTS DIVISION | 550 HIGH STREET | BRADFORD, PA 16701 |
| 27014 | NATIONAL SEMICONDUCTOR CORP. | 2900 SEMICONDUCTOR DR. | SANTA CLARA, CA 95051 |
| 32159 | WEST-CAP ARIZONA | 2201 E. ELVIRA ROAD | TUCSON, AZ 85706 |
| 32997 | BOURNS, INC., TRIMPOT PRODUCTS DIV. | 1200 COLUMBIA AVE. | RIVERSIDE, CA 92507 |
| 33096 | COLORADO CRYSTAL CORPORATION | 2303 W 8TH STREET | LOVELAND, CO 80537 |
| 34335 | ADVANCED MICRO DEVICES | 901 THOMPSON PL. | SUNNYVALE, CA 94086 |
| 50437 | RELIANCE STEEL PRODUCTS COMPANY | 3700 WALNUT STREET | MCKEESPORT, PA 15132 |
| 50522 | MONSANTO CO., ELECTRONIC SPECIAL PRODUCTS | 3400 HILLVIEW AVENUE | PALO ALTO, CA 94304 |
| 55680 | NICHICON/AMERICA/CORP. | 6435 N PROESEL AVENUE | CHICAGO, IL 60645 |
| 56289 | SPRAGUE ELECTRIC CO. | | NORTH ADAMS, MA 01247 |
| 71400 | BUSSMAN MFG., DIVISION OF MCGRAW- EDISON CO. | 2536 W. UNIVERSITY ST. | ST. LOUIS, MO 63107 |
| 72136 | ELECTRO MOTIVE CORPORATION, SUB OF INTERNATIONAL ELECTRONICS CORPORATION | SOUTH PARK AND JOHN STREETS | WILLIMANTIC, CT 06226 |
| 72982 | ERIE TECHNOLOGICAL PRODUCTS, INC. | 644 W. 12TH ST. | ERIE, PA 16512 |
| 74970 | JOHNSON, E. F., CO. | 299 10TH AVE. S. W. | WASECA, MN 56093 |
| 75042 | TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION | 401 N. BROAD ST. | PHILADELPHIA, PA 19108 |
| 76493 | BELL INDUSTRIES, INC., MILLER, J. W., DIV. | 19070 REYES AVE., P O BOX 5825 | COMPTON, CA 90224 |
| 80009 | TEKTRONIX, INC. | P O BOX 500 | BEAVERTON, OR 97077 |
| 80031 | ELECTRA-MIDLAND CORP., MEPCO DIV. | 22 COLUMBIA ROAD | MORRISTOWN, NJ 07960 |
| 90201 | MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC. | 3029 E WASHINGTON STREET | INDIANAPOLIS, IN 46206 |
| 91637 | DALE ELECTRONICS, INC. | P O BOX 372 P. O. BOX 609 | COLUMBUS, NE 68601 |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|---|-------------|-----------------|
| A1 | 670-4901-00 | | CKT CARD ASSY: | 80009 | 670-4901-00 |
| A2 | 670-4968-00 | | CKT CARD ASSY: | 80009 | 670-4968-00 |
| A3 | 670-4965-00 | | CKT CARD ASSY: | 80009 | 670-4965-00 |
| A4 | 672-0793-00 | B010100 | CKT BOARD ASSY: SYNC AND TIMING | 80009 | 672-0793-00 |
| A4 | 672-0793-01 | B020000 | CKT BOARD ASSY: SYNC AND TIMING | 80009 | 672-0793-01 |
| A5 | 670-4900-00 | B010100 | CKT CARD ASSY: | 80009 | 670-4900-00 |
| A5 | 670-4900-01 | B010310 | CKT BOARD ASSY: PULSE OUTPUT | 80009 | 670-4900-01 |
| A6 | 672-0794-00 | | CKT BOARD ASSY: CROSSHATCH | 80009 | 672-0794-00 |
| A7 | 672-0792-00 | | CKT BOARD ASSY: COLOR BAR LOGIC | 80009 | 672-0792-00 |
| A8 | 670-4902-00 | | CKT CARD ASSY: | 80009 | 670-4902-00 |
| A9 | 670-4898-00 | | CKT CARD ASSY: | 80009 | 670-4898-00 |
| C3 | 290-0632-00 | | CAP., FXD, ELCTLT: 6200UF, +75-10%, 15V | 56289 | 39D357 |
| C4 | 290-0632-00 | | CAP., FXD, ELCTLT: 6200UF, +75-10%, 15V | 56289 | 39D357 |
| C5 | 285-0598-00 | | CAP., FXD, PLSTC: 0.01UF, 5%, 100V | 19396 | DU490B103J |
| C12 | 290-0296-00 | | CAP., FXD, ELCTLT: 100UF, 20%, 20V | 56289 | 150D107X0020S2 |
| C15 | 283-0026-00 | | CAP., FXD, CER DI: 0.2UF, +80-20%, 25V | 56289 | 274C3 |
| C24 | 285-0598-00 | | CAP., FXD, PLSTC: 0.01UF, 5%, 100V | 19396 | DU490B103J |
| C25 | 283-0026-00 | | CAP., FXD, CER DI: 0.2UF, +80-20%, 25V | 56289 | 274C3 |
| C32 | 290-0135-00 | | CAP., FXD, ELCTLT: 15UF, 20%, 20V | 56289 | 150D156X0020B2 |
| C33 | 290-0135-00 | | CAP., FXD, ELCTLT: 15UF, 20%, 20V | 56289 | 150D156X0020B2 |
| C38 | 283-0026-00 | | CAP., FXD, CER DI: 0.2UF, +80-20%, 25V | 56289 | 274C3 |
| C41 | 285-0598-00 | | CAP., FXD, PLSTC: 0.01UF, 5%, 100V | 19396 | DU490B103J |
| C43 | 290-0633-00 | | CAP., FXD, ELCTLT: 2400UF, +75-10%, 30V | 56289 | 39D360 |
| C44 | 290-0633-00 | | CAP., FXD, ELCTLT: 2400UF, +75-10%, 30V | 56289 | 39D360 |
| C46 | 283-0000-00 | | CAP., FXD, CER DI: 0.001UF, +100-0%, 500V | 59660 | 0831610Y5P0102D |
| C91 | 281-0775-00 | | CAP., FXD, CER DI: 0.1UF, 20%, 50V | 04222 | SA205E104MAA |
| C92 | 281-0775-00 | | CAP., FXD, CER DI: 0.1UF, 20%, 50V | 04222 | SA205E104MAA |
| C111 | 283-0622-00 | | CAP., FXD, MICA D: 450PF, 1%, 300V | 00853 | D153F451F0 |
| C113 | 290-0517-00 | | CAP., FXD, ELCTLT: 6.8UF, 20%, 35V | 56289 | 196D685X0035KA1 |
| C114 | 290-0517-00 | | CAP., FXD, ELCTLT: 6.8UF, 20%, 35V | 56289 | 196D685X0035KA1 |
| C116 | 281-0131-00 | | CAP., VAR, AIR DI: 2.4-24.5PF, 250V | 74970 | 189-0509-075 |
| C125 | 281-0775-00 | | CAP., FXD, CER DI: 0.1UF, 20%, 50V | 04222 | SA205E104MAA |
| C126 | 283-0149-00 | | CAP., FXD, CER DI: 25PF, 2%, 200V | 72982 | 865-528T2H250G |
| C130 | 290-0745-00 | | CAP., FXD, ELCTLT: 22UF, +50-10%, 25V | 56289 | 502D225 |
| C132 | 283-0000-00 | | CAP., FXD, CER DI: 0.001UF, +100-0%, 500V | 59660 | 0831610Y5P0102D |
| C140 | 290-0745-00 | | CAP., FXD, ELCTLT: 22UF, +50-10%, 25V | 56289 | 502D225 |
| C142 | 283-0644-00 | | CAP., FXD, MICA D: 150PF, 1%, 500V | 00853 | D155F151F0 |
| C150 | 290-0745-00 | | CAP., FXD, ELCTLT: 22UF, +50-10%, 25V | 56289 | 502D225 |
| C151 | 283-0598-00 | | CAP., FXD, MICA D: 253PF, 5%, 300V | 09023 | CD15EC(253)J03 |
| C155 | 283-0624-00 | | CAP., FXD, MICA D: 1300PF, 2%, 500V | 00853 | D195F132G0 |
| C156 | 283-0604-00 | | CAP., FXD, MICA D: 304PF, 2%, 300V | 00853 | D153F3040G0 |
| C165 | 281-0775-00 | | CAP., FXD, CER DI: 0.1UF, 20%, 50V | 04222 | SA205E104MAA |
| C168 | 283-0622-00 | | CAP., FXD, MICA D: 450PF, 1%, 300V | 00853 | D153F451F0 |
| C178 | 281-0775-00 | | CAP., FXD, CER DI: 0.1UF, 20%, 50V | 04222 | SA205E104MAA |
| C179 | 283-0000-00 | | CAP., FXD, CER DI: 0.001UF, +100-0%, 500V | 59660 | 0831610Y5P0102D |
| C187 | 281-0775-00 | | CAP., FXD, CER DI: 0.1UF, 20%, 50V | 04222 | SA205E104MAA |
| C188 | 283-0598-00 | | CAP., FXD, MICA D: 253PF, 5%, 300V | 09023 | CD15EC(253)J03 |
| C196 | 281-0775-00 | | CAP., FXD, CER DI: 0.1UF, 20%, 50V | 04222 | SA205E104MAA |
| C197 | 283-0604-00 | | CAP., FXD, MICA D: 304PF, 2%, 300V | 00853 | D153F3040G0 |
| C198 | 281-0775-00 | | CAP., FXD, CER DI: 0.1UF, 20%, 50V | 04222 | SA205E104MAA |
| C208 | 281-0131-00 | | CAP., VAR, AIR DI: 2.4-24.5PF, 250V | 74970 | 189-0509-075 |
| C209 | 290-0517-00 | | CAP., FXD, ELCTLT: 6.8UF, 20%, 35V | 56289 | 196D685X0035KA1 |
| C216 | 283-0604-00 | | CAP., FXD, MICA D: 304PF, 2%, 300V | 00853 | D153F3040G0 |

Replaceable Electrical Parts—143

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Discont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|-------------------------|---------|--------------------------------------|-------------|------------------|
| C219 | 290-0517-00 | | | CAP.,FXD,ELCTLT:6.8UF,20%,35V | 56289 | 196D685X0035KA1 |
| C227 | 281-0775-00 | | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C228 | 283-0641-00 | | | CAP.,FXD,MICA D:180PF,1%,100V | 00853 | D151E181F0 |
| C229 | 283-0642-00 | | | CAP.,FXD,MICA D:33PF,+/-0.5PF,300V | 00853 | D10-5E330G |
| C230 | 290-0745-00 | | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C232 | 290-0745-00 | B010100 | B019999 | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C237 | 281-0775-00 | | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C238 | 281-0775-00 | | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C245 | 281-0775-00 | | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C248 | 281-0775-00 | | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C250 | 290-0745-00 | | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C252 | 290-0745-00 | | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C259 | 283-0084-00 | B010100 | B019999 | CAP.,FXD,CER DI:270PF,5%,1000V | 59660 | 838 533X5F0 2715 |
| C267 | 283-0000-00 | B010100 | B019999 | CAP.,FXD,CER DI:0.001UF,+100-0%,500V | 59660 | 0831610Y5P0102D |
| C269 | 283-0084-00 | | | CAP.,FXD,CER DI:270PF,5%,1000V | 59660 | 838 533X5F0 2715 |
| C277 | 283-0000-00 | | | CAP.,FXD,CER DI:0.001UF,+100-0%,500V | 59660 | 0831610Y5P0102D |
| C288 | 283-0604-00 | | | CAP.,FXD,MICA D:304PF,2%,300V | 00853 | D153F3040G0 |
| C289 | 283-0638-00 | | | CAP.,FXD,MICA D:130PF,1%,100V | 00853 | D151F131F0 |
| C295 | 290-0745-00 | | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C297 | 281-0775-00 | | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C299 | 281-0123-00 | | | CAP.,VAR,CER DI:5-25PF,100V | 59660 | 518-000A5-25 |
| C303 | 283-0164-00 | | | CAP.,FXD,CER DI:2.2UF,20%,25V | 04222 | 3431-025E-225M |
| C307 | 281-0775-00 | | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C308 | 283-0604-00 | | | CAP.,FXD,MICA D:304PF,2%,300V | 00853 | D153F3040G0 |
| C309 | 283-0615-00 | | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C310 | 283-0594-00 | | | CAP.,FXD,MICA D:0.001UF,1%,100V | 00853 | D151F102F0 |
| C313 | 283-0677-00 | | | CAP.,FXD,MICA D:82PF,1%,500V | 00853 | D155E820F0 |
| C317 | 283-0000-00 | | | CAP.,FXD,CER DI:0.001UF,+100-0%,500V | 59660 | 0831610Y5P0102D |
| C318 | 281-0775-00 | | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C319 | 290-0517-00 | | | CAP.,FXD,ELCTLT:6.8UF,20%,35V | 56289 | 196D685X0035KA1 |
| C322 | 283-0598-00 | | | CAP.,FXD,MICA D:253PF,5%,300V | 09023 | CD15EC(253)J03 |
| C323 | 290-0245-00 | | | CAP.,FXD,ELCTLT:1.5UF,10%,10V | 56289 | 150D155X9010A2 |
| C329 | 290-0517-00 | | | CAP.,FXD,ELCTLT:6.8UF,20%,35V | 56289 | 196D685X0035KA1 |
| C337 | 281-0775-00 | | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C342 | 283-0058-00 | | | CAP.,FXD,CER DI:0.027UF,10%,100V | 56289 | 273C17 |
| C344 | 283-0622-00 | | | CAP.,FXD,MICA D:450PF,1%,300V | 00853 | D153F451F0 |
| C351 | 285-0598-00 | | | CAP.,FXD,PLSTC:0.01UF,5%,100V | 19396 | DU490B103J |
| C352 | 281-0775-00 | | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C359 | 283-0594-00 | | | CAP.,FXD,MICA D:0.001UF,1%,100V | 00853 | D151F102F0 |
| C367 | 283-0594-00 | | | CAP.,FXD,MICA D:0.001UF,1%,100V | 00853 | D151F102F0 |
| C380 | 290-0523-00 | | | CAP.,FXD,ELCTLT:2.2UF,20%,20V | 56289 | 196D225X0020HA1 |
| C381 | 283-0084-00 | | | CAP.,FXD,CER DI:270PF,5%,1000V | 59660 | 838 533X5F0 2715 |
| C383 | 283-0003-00 | | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C412 | 283-0615-00 | | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C413 | 285-1073-00 | | | CAP.,FXD,PLSTC:0.0033UF,5%,400V | 14752 | 230B1E332J |
| C414 | 283-0110-00 | | | CAP.,FXD,CER DI:0.005UF,+80-20%,150V | 56289 | 19C242B |
| C419 | 283-0080-00 | | | CAP.,FXD,CER DI:0.022UF,+80-20%,25V | 91418 | MX223Z2504R0 |
| C426 | 283-0615-00 | | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C428 | 283-0639-00 | | | CAP.,FXD,MICA D:56PF,1%,100V | 00853 | D151E560F0 |
| C438 | 283-0080-00 | | | CAP.,FXD,CER DI:0.022UF,+80-20%,25V | 91418 | MX223Z2504R0 |
| C442 | 285-0683-00 | | | CAP.,FXD,PLSTC:0.022UF,5%,100V | 56289 | 192P22352 |
| C446 | 283-0644-00 | | | CAP.,FXD,MICA D:150PF,1%,500V | 00853 | D155F151F0 |
| C449 | 283-0080-00 | | | CAP.,FXD,CER DI:0.022UF,+80-20%,25V | 91418 | MX223Z2504R0 |
| C450 | 290-0517-00 | | | CAP.,FXD,ELCTLT:6.8UF,20%,35V | 56289 | 196D685X0035KA1 |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|--------------------------------------|-------------|------------------|
| C456 | 283-0691-00 | | CAP.,FXD,MICA D:650PF,1%,300V | 00853 | D153F651F0 |
| C458 | 283-0000-00 | | CAP.,FXD,CER DI:0.001UF,+100-0%,500V | 59660 | 0831610Y5P0102D |
| C461 | 283-0080-00 | | CAP.,FXD,CER DI:0.022UF,+80-20%,25V | 91418 | MX223Z2504R0 |
| C468 | 290-0527-00 | | CAP.,FXD,ELCTLT:15UF,20%,20V | 90201 | TDC156M020FL |
| C470 | 283-0080-00 | | CAP.,FXD,CER DI:0.022UF,+80-20%,25V | 91418 | MX223Z2504R0 |
| C479 | 290-0246-00 | | CAP.,FXD,ELCTLT:3.3UF,10%,15V | 56289 | 162D335X9015CD2 |
| C480 | 283-0649-00 | | CAP.,FXD,MICA D:105PF,1%,300V | 00853 | D153F1050F0 |
| C486 | 283-0649-00 | | CAP.,FXD,MICA D:105PF,1%,300V | 00853 | D153F1050F0 |
| C492 | 283-0000-00 | | CAP.,FXD,CER DI:0.001UF,+100-0%,500V | 59660 | 0831610Y5P0102D |
| C493 | 283-0728-00 | | CAP.,FXD,MICA D:120PF,1%,500V | 00853 | D155F121F0 |
| C494 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C506 | 283-0730-00 | | CAP.,FXD,MICA D:274PF,1%,500V | 00853 | D155F2740F0 |
| C508 | 283-0598-00 | | CAP.,FXD,MICA D:253PF,5%,300V | 09023 | CD15EC(253)J03 |
| C510 | 283-0730-00 | | CAP.,FXD,MICA D:274PF,1%,500V | 00853 | D155F2740F0 |
| C512 | 283-0000-00 | | CAP.,FXD,CER DI:0.001UF,+100-0%,500V | 59660 | 0831610Y5P0102D |
| C515 | 281-0534-00 | | CAP.,FXD,CER DI:3.3PF,+/-0.25PF,500V | 04222 | 7001-1316 |
| C516 | 283-0639-00 | | CAP.,FXD,MICA D:56PF,1%,100V | 00853 | D151E560F0 |
| C518 | 283-0004-00 | | CAP.,FXD,CER DI:0.02UF,+80-20%,150V | 91418 | SP203Z151-4R9 |
| C519 | 285-0808-00 | | CAP.,FXD,PLSTC:0.1UF,10%,50V | 56289 | LP66A1A104K004 |
| C520 | 283-0639-00 | | CAP.,FXD,MICA D:56PF,1%,100V | 00853 | D151E560F0 |
| C521 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C522 | 283-0000-00 | | CAP.,FXD,CER DI:0.001UF,+100-0%,500V | 59660 | 0831610Y5P0102D |
| C525 | 283-0080-00 | | CAP.,FXD,CER DI:0.022UF,+80-20%,25V | 91418 | MX223Z2504R0 |
| C526 | 283-0691-00 | | CAP.,FXD,MICA D:650PF,1%,300V | 00853 | D153F651F0 |
| C528 | 290-0536-00 | | CAP.,FXD,ELCTLT:10UF,20%,25V | 90201 | TDC106M025FL |
| C530 | 283-0691-00 | | CAP.,FXD,MICA D:650PF,1%,300V | 00853 | D153F651F0 |
| C532 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C537 | 290-0534-00 | | CAP.,FXD,ELCTLT:1UF,20%,35V | 56289 | 196D105X0035HA1 |
| C540 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C545 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C546 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C547 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C548 | 283-0177-00 | | CAP.,FXD,CER DI:1UF,+80-20%,25V | 56289 | 273C5 |
| C549 | 290-0534-00 | | CAP.,FXD,ELCTLT:1UF,20%,35V | 56289 | 196D105X0035HA1 |
| C551 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C553 | 283-0728-00 | | CAP.,FXD,MICA D:120PF,1%,500V | 00853 | D155F121F0 |
| C555 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C557 | 283-0706-00 | | CAP.,FXD,MICA D:91PF,+/-1PF,500V | 00853 | D155F910F0 |
| C559 | 283-0643-00 | B010310 | CAP.,FXD,MICA D:22PF,+/-0.5PF,300V | 00853 | D105E220D0 |
| C560 | 281-0205-00 | | CAP.,VAR,PLSTC:5.5-65PF,100V | 80031 | 2810C5R565QJ02F0 |
| C561 | 283-0603-00 | | CAP.,FXD,MICA D:113PF,2%,300V | 00853 | D153F1130G0 |
| C562 | 283-0615-00 | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C563 | 283-0648-00 | | CAP.,FXD,MICA D:10PF,5%,100V | 00853 | D151C100D0 |
| C564 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C565 | 283-0198-00 | | CAP.,FXD,CER DI:0.22UF,20%,50V | 56289 | 1C10Z5U223M050B |
| C567 | 290-0302-00 | | CAP.,FXD,ELCTLT:100UF,10%,20V | 12954 | D100D20KI |
| C568 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C570 | 281-0205-00 | | CAP.,VAR,PLSTC:5.5-65PF,100V | 80031 | 2810C5R565QJ02F0 |
| C571 | 283-0603-00 | | CAP.,FXD,MICA D:113PF,2%,300V | 00853 | D153F1130G0 |
| C572 | 283-0615-00 | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C573 | 283-0648-00 | | CAP.,FXD,MICA D:10PF,5%,100V | 00853 | D151C100D0 |
| C576 | 283-0080-00 | | CAP.,FXD,CER DI:0.022UF,+80-20%,25V | 91418 | MX223Z2504R0 |
| C577 | 283-0644-00 | | CAP.,FXD,MICA D:150PF,1%,500V | 00853 | D155F151F0 |
| C578 | 283-0644-00 | | CAP.,FXD,MICA D:150PF,1%,500V | 00853 | D155F151F0 |

Replaceable Electrical Parts—143

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|-------------------------------------|-------------|------------------|
| C579 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C580 | 281-0205-00 | | CAP.,VAR,PLSTC:5.5-65PF,100V | 80031 | 2810C5R565QJ02F0 |
| C581 | 283-0603-00 | | CAP.,FXD,MICA D:113PF,2%,300V | 00853 | D153F1130G0 |
| C582 | 283-0615-00 | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C583 | 283-0648-00 | | CAP.,FXD,MICA D:10PF,5%,100V | 00853 | D151C100D0 |
| C584 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C587 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C590 | 281-0205-00 | | CAP.,VAR,PLSTC:5.5-65PF,100V | 80031 | 2810C5R565QJ02F0 |
| C591 | 283-0603-00 | | CAP.,FXD,MICA D:113PF,2%,300V | 00853 | D153F1130G0 |
| C592 | 283-0615-00 | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C593 | 283-0648-00 | | CAP.,FXD,MICA D:10PF,5%,100V | 00853 | D151C100D0 |
| C594 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C599 | 283-0119-00 | | CAP.,FXD,CER DI:2200PF,5%,200V | 59660 | 855-536Y5E0222J |
| C600 | 281-0205-00 | | CAP.,VAR,PLSTC:5.5-65PF,100V | 80031 | 2810C5R565QJ02F0 |
| C601 | 283-0603-00 | | CAP.,FXD,MICA D:113PF,2%,300V | 00853 | D153F1130G0 |
| C602 | 283-0615-00 | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C603 | 283-0648-00 | | CAP.,FXD,MICA D:10PF,5%,100V | 00853 | D151C100D0 |
| C605 | 283-0643-00 | B010310 | CAP.,FXD,MICA D:22PF,+/-0.5PF,300V | 00853 | D105E220D0 |
| C607 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C609 | 283-0119-00 | | CAP.,FXD,CER DI:2200PF,5%,200V | 59660 | 855-536Y5E0222J |
| C610 | 281-0205-00 | | CAP.,VAR,PLSTC:5.5-65PF,100V | 80031 | 2810C5R565QJ02F0 |
| C611 | 283-0603-00 | | CAP.,FXD,MICA D:113PF,2%,300V | 00853 | D153F1130G0 |
| C612 | 283-0615-00 | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C613 | 283-0648-00 | | CAP.,FXD,MICA D:10PF,5%,100V | 00853 | D151C100D0 |
| C616 | 283-0644-00 | | CAP.,FXD,MICA D:150PF,1%,500V | 00853 | D155F151F0 |
| C617 | 283-0644-00 | | CAP.,FXD,MICA D:150PF,1%,500V | 00853 | D155F151F0 |
| C618 | 283-0080-00 | | CAP.,FXD,CER DI:0.022UF,+80-20%,25V | 91418 | MX223Z2504R0 |
| C620 | 281-0205-00 | | CAP.,VAR,PLSTC:5.5-65PF,100V | 80031 | 2810C5R565QJ02F0 |
| C621 | 283-0603-00 | | CAP.,FXD,MICA D:113PF,2%,300V | 00853 | D153F1130G0 |
| C622 | 283-0615-00 | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C623 | 283-0648-00 | | CAP.,FXD,MICA D:10PF,5%,100V | 00853 | D151C100D0 |
| C625 | 283-0003-00 | | CAP.,FXD,CER DI:0.01UF,+80-20%,150V | 91418 | SP103Z151-4R9 |
| C626 | 290-0302-00 | | CAP.,FXD,ELCTLT:100UF,10%,20V | 12954 | D100D20KI |
| C627 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C628 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C629 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C630 | 281-0205-00 | | CAP.,VAR,PLSTC:5.5-65PF,100V | 80031 | 2810C5R565QJ02F0 |
| C631 | 283-0603-00 | | CAP.,FXD,MICA D:113PF,2%,300V | 00853 | D153F1130G0 |
| C632 | 283-0615-00 | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C633 | 283-0648-00 | | CAP.,FXD,MICA D:10PF,5%,100V | 00853 | D151C100D0 |
| C635 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C636 | 283-0198-00 | | CAP.,FXD,CER DI:0.22UF,20%,50V | 56289 | 1C10Z5U223M050B |
| C639 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C641 | 281-0579-00 | | CAP.,FXD,CER DI:21PF,5%,500V | 59660 | 301-050C0G0210J |
| C646 | 283-0622-00 | | CAP.,FXD,MICA D:450PF,1%,300V | 00853 | D153F451F0 |
| C648 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C649 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C654 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C656 | 283-0601-00 | | CAP.,FXD,MICA D:22PF,10%,300V | 00853 | D153C220K0 |
| C658 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C662 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C664 | 281-0626-00 | | CAP.,FXD,CER DI:3.3PF,1%,500V | 59660 | 301-000C0J0339B |
| C666 | 283-0640-00 | | CAP.,FXD,MICA D:160PF,1%,100V | 00853 | D151E161F0 |
| C673 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|------------------------------------|-------------|------------------|
| C676 | 283-0634-00 | | CAP.,FXD,MICA D:65PF,1%,100V | 00853 | D151E650F0 |
| C679 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C681 | 281-0579-00 | | CAP.,FXD,CER DI:21PF,5%,500V | 59660 | 301-050C0G0210J |
| C684 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C686 | 283-0622-00 | | CAP.,FXD,MICA D:450PF,1%,300V | 00853 | D153F451F0 |
| C693 | 281-0626-00 | | CAP.,FXD,CER DI:3.3PF,1%,500V | 59660 | 301-000C0J0339B |
| C696 | 283-0601-00 | | CAP.,FXD,MICA D:22PF,10%,300V | 00853 | D153C220K0 |
| C701 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C706 | 283-0640-00 | | CAP.,FXD,MICA D:160PF,1%,100V | 00853 | D151E161F0 |
| C713 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C716 | 283-0634-00 | | CAP.,FXD,MICA D:65PF,1%,100V | 00853 | D151E650F0 |
| C721 | 281-0579-00 | | CAP.,FXD,CER DI:21PF,5%,500V | 59660 | 301-050C0G0210J |
| C724 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C726 | 283-0622-00 | | CAP.,FXD,MICA D:450PF,1%,300V | 00853 | D153F451F0 |
| C733 | 281-0626-00 | | CAP.,FXD,CER DI:3.3PF,1%,500V | 59660 | 301-000C0J0339B |
| C736 | 283-0601-00 | | CAP.,FXD,MICA D:22PF,10%,300V | 00853 | D153C220K0 |
| C741 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C746 | 283-0640-00 | | CAP.,FXD,MICA D:160PF,1%,100V | 00853 | D151E161F0 |
| C752 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C756 | 283-0634-00 | | CAP.,FXD,MICA D:65PF,1%,100V | 00853 | D151E650F0 |
| C759 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C765 | 283-0672-00 | | CAP.,FXD,MICA D:200PF,1%,500V | 00853 | D155F2010F0 |
| C767 | 283-0598-00 | | CAP.,FXD,MICA D:253PF,5%,300V | 09023 | CD15EC(253)J03 |
| C771 | 283-0633-00 | | CAP.,FXD,MICA D:77PF,1%,100V | 00853 | D151E770F0 |
| C772 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C783 | 283-0597-00 | | CAP.,FXD,MICA D:470PF,10%,300V | 00853 | D153E471K0 |
| C784 | 283-0638-00 | | CAP.,FXD,MICA D:130PF,1%,100V | 00853 | D151F131F0 |
| C787 | 285-0703-00 | | CAP.,FXD,PLSTC:0.1UF,5%,100V | 56289 | 192P10452 |
| C791 | 283-0633-00 | | CAP.,FXD,MICA D:77PF,1%,100V | 00853 | D151E770F0 |
| C797 | 283-0622-00 | | CAP.,FXD,MICA D:450PF,1%,300V | 00853 | D153F451F0 |
| C805 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C806 | 283-0601-00 | | CAP.,FXD,MICA D:22PF,10%,300V | 00853 | D153C220K0 |
| C807 | 283-0640-00 | | CAP.,FXD,MICA D:160PF,1%,100V | 00853 | D151E161F0 |
| C817 | 283-0634-00 | | CAP.,FXD,MICA D:65PF,1%,100V | 00853 | D151E650F0 |
| C818 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C824 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C825 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C834 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C836 | 281-0593-00 | | CAP.,FXD,CER DI:3.9PF,10%,500V | 04222 | 7001-1113 |
| C839 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C845 | 281-0524-00 | | CAP.,FXD,CER DI:150PF,+/-30PF,500V | 04222 | 7001-1381 |
| C846 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C853 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C855 | 281-0739-00 | | CAP.,FXD,CER DI:18PF,5%,500V | 59660 | 301-000T2H0 180J |
| C858 | 281-0739-00 | | CAP.,FXD,CER DI:18PF,5%,500V | 59660 | 301-000T2H0 180J |
| C862 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C865 | 283-0672-00 | | CAP.,FXD,MICA D:200PF,1%,500V | 00853 | D155F2010F0 |
| C887 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C907 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C953 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C955 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C973 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C974 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C981 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |

Replaceable Electrical Parts—143

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|-------------------------------------|-------------|------------------|
| C983 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C984 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C985 | 281-0504-00 | | CAP.,FXD,CER DI:10PF,+/-1PF,500V | 59660 | 301-055C0G0100F |
| C986 | 283-0677-00 | | CAP.,FXD,MICA D:82PF,1%,500V | 00853 | D155E820F0 |
| C995 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C996 | 283-0696-00 | | CAP.,FXD,MICA D:2300PF,1%,500V | 00853 | D195F232F0 |
| C999 | 290-0804-00 | | CAP.,FXD,ELCTLT:10UF,+50-10%,25V | 55680 | 25ULA10V-T |
| C1007 | 283-0696-00 | | CAP.,FXD,MICA D:2300PF,1%,500V | 00853 | D195F232F0 |
| C1013 | 290-0720-00 | | CAP.,FXD,ELCTLT:68UF,20%,15V | 56289 | 196D686X0015PE3 |
| C1017 | 290-0804-00 | | CAP.,FXD,ELCTLT:10UF,+50-10%,25V | 55680 | 25ULA10V-T |
| C1023 | 283-0627-00 | | CAP.,FXD,MICA D:0.0033UF,5%,500V | 00853 | D195F332J0 |
| C1024 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1045 | 290-0804-00 | | CAP.,FXD,ELCTLT:10UF,+50-10%,25V | 55680 | 25ULA10V-T |
| C1053 | 281-0509-00 | | CAP.,FXD,CER DI:15PF,+/-1.5PF,500V | 59660 | 301-000C0G0150K |
| C1054 | 283-0594-00 | | CAP.,FXD,MICA D:0.001UF,1%,100V | 00853 | D151F102F0 |
| C1055 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1056 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1071 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1075 | 283-0674-00 | | CAP.,FXD,MICA D:85PF,1%,500V | 00853 | D155F850F0 |
| C1078 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1089 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1090 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1091 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1101 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1118 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1127 | 283-0644-00 | | CAP.,FXD,MICA D:150PF,1%,500V | 00853 | D155F151F0 |
| C1129 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1135 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1144 | 283-0649-00 | | CAP.,FXD,MICA D:105PF,1%,300V | 00853 | D153F1050F0 |
| C1146 | 283-0177-00 | | CAP.,FXD,CER DI:1UF,+80-20%,25V | 56289 | 273C5 |
| C1151 | 283-0598-00 | | CAP.,FXD,MICA D:253PF,5%,300V | 09023 | CD15EC(253)J03 |
| C1165 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1171 | 283-0728-00 | | CAP.,FXD,MICA D:120PF,1%,500V | 00853 | D155F121F0 |
| C1172 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1175 | 290-0536-00 | | CAP.,FXD,ELCTLT:10UF,20%,25V | 90201 | TDC106M025FL |
| C1182 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1198 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1201 | 283-0634-00 | | CAP.,FXD,MICA D:65PF,1%,100V | 00853 | D151E650F0 |
| C1204 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1213 | 283-0631-00 | | CAP.,FXD,MICA D:95PF,1%,100V | 00853 | D151E950F0 |
| C1217 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1229 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1233 | 283-0164-00 | | CAP.,FXD,CER DI:2.2UF,20%,25V | 04222 | 3431-025E-225M |
| C1241 | 283-0594-00 | | CAP.,FXD,MICA D:0.001UF,1%,100V | 00853 | D151F102F0 |
| C1256 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1260 | 281-0592-00 | | CAP.,FXD,CER DI:4.7PF,+/-0.5PF,500V | 59660 | 301-000-C0H0479D |
| C1261 | 283-0597-00 | | CAP.,FXD,MICA D:470PF,10%,300V | 00853 | D153E471K0 |
| C1269 | 283-0164-00 | | CAP.,FXD,CER DI:2.2UF,20%,25V | 04222 | 3431-025E-225M |
| C1271 | 283-0177-00 | | CAP.,FXD,CER DI:1UF,+80-20%,25V | 56289 | 273C5 |
| C1277 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1278 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1281 | 283-0660-00 | | CAP.,FXD,MICA D:510PF,2%,500V | 00853 | D155F511G0 |
| C1283 | 283-0177-00 | | CAP.,FXD,CER DI:1UF,+80-20%,25V | 56289 | 273C5 |
| C1290 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|--------------------------------------|-------------|-----------------|
| C1291 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C1302 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C1307 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1314 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1321 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C1325 | 283-0629-00 | | CAP.,FXD,MICA D:62PF,1%,500V | 00853 | D105E620F0 |
| C1326 | 283-0642-00 | | CAP.,FXD,MICA D:33PF,+/-0.5PF,300V | 00853 | D10-5E330G |
| C1331 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C1335 | 283-0599-00 | | CAP.,FXD,MICA D:98PF,5%,500V | 00853 | D105F980J0 |
| C1336 | 283-0599-00 | | CAP.,FXD,MICA D:98PF,5%,500V | 00853 | D105F980J0 |
| C1337 | 283-0600-00 | | CAP.,FXD,MICA D:43PF,5%,500V | 00853 | D105E430J0 |
| C1344 | 283-0670-00 | | CAP.,FXD,MICA D:375PF,1%,500V | 00853 | D155F3750F0 |
| C1353 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1354 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1384 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1387 | 283-0649-00 | | CAP.,FXD,MICA D:105PF,1%,300V | 00853 | D153F1050F0 |
| C1396 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1403 | 283-0631-00 | | CAP.,FXD,MICA D:95PF,1%,100V | 00853 | D151E950F0 |
| C1404 | 281-0091-00 | | CAP.,VAR,CER DI:2-8PF | 59660 | 538-011 A2-8 |
| C1405 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1409 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C1410 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1414 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1441 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1443 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1446 | 290-0718-00 | | CAP.,FXD,ELCTLT:22UF,20%,35V | 56289 | 196D226X0035PE4 |
| C1456 | 283-0706-00 | | CAP.,FXD,MICA D:91PF,+/-1PF,500V | 00853 | D155F910F0 |
| C1457 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1459 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1464 | 283-0706-00 | | CAP.,FXD,MICA D:91PF,+/-1PF,500V | 00853 | D155F910F0 |
| C1474 | 283-0636-00 | | CAP.,FXD,MICA D:36PF,1.4%,100V | 00853 | D155E360G0 |
| C1482 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1484 | 283-0632-00 | | CAP.,FXD,MICA D:87PF,1%,100V | 00853 | D151E870F0 |
| C1494 | 283-0633-00 | | CAP.,FXD,MICA D:77PF,1%,100V | 00853 | D151E770F0 |
| C1496 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1498 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C1502 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1505 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1508 | 290-0745-00 | | CAP.,FXD,ELCTLT:22UF,+50-10%,25V | 56289 | 502D225 |
| C1517 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1519 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1523 | 283-0637-00 | | CAP.,FXD,MICA D:20PF,2.5%,100V | 00853 | D151E200D0 |
| C1526 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1532 | 283-0725-00 | | CAP.,FXD,MICA D:214PF,1%,500V | 00853 | D155F2140F0 |
| C1533 | 283-0706-00 | | CAP.,FXD,MICA D:91PF,+/-1PF,500V | 00853 | D155F910F0 |
| C1535 | 283-0636-00 | | CAP.,FXD,MICA D:36PF,1.4%,100V | 00853 | D155E360G0 |
| C1541 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1559 | 281-0500-00 | | CAP.,FXD,CER DI:2.2PF,+/-0.5PF,500V | 04222 | 7001-1092 |
| C1562 | 283-0641-00 | | CAP.,FXD,MICA D:180PF,1%,100V | 00853 | D151E181F0 |
| C1563 | 283-0663-00 | | CAP.,FXD,MICA D:16.8PF,+/-0.5PF,500V | 00853 | D155C16R8D0 |
| C1565 | 283-0615-00 | | CAP.,FXD,MICA D:33PF,5%,500V | 00853 | D155E330J0 |
| C1569 | 281-0775-00 | | CAP.,FXD,CER DI:0.1UF,20%,50V | 04222 | SA205E104MAA |
| C1573 | 283-0633-00 | | CAP.,FXD,MICA D:77PF,1%,100V | 00853 | D151E770F0 |

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| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|------------------------------------|-------------|-----------------|
| CR3 | 152-0198-00 | | SEMICONV DEVICE:SILICON,200V,3A | 03508 | 1N5624 |
| CR8 | 152-0198-00 | | SEMICONV DEVICE:SILICON,200V,3A | 03508 | 1N5624 |
| CR10 | 152-0066-00 | | SEMICONV DEVICE:SILICON,400V,750MA | 14433 | LG4016 |
| CR11 | 152-0066-00 | | SEMICONV DEVICE:SILICON,400V,750MA | 14433 | LG4016 |
| CR16 | 152-0066-00 | | SEMICONV DEVICE:SILICON,400V,750MA | 14433 | LG4016 |
| CR17 | 152-0066-00 | | SEMICONV DEVICE:SILICON,400V,750MA | 14433 | LG4016 |
| CR41 | 152-0198-00 | | SEMICONV DEVICE:SILICON,200V,3A | 03508 | 1N5624 |
| CR42 | 152-0198-00 | | SEMICONV DEVICE:SILICON,200V,3A | 03508 | 1N5624 |
| CR48 | 152-0198-00 | | SEMICONV DEVICE:SILICON,200V,3A | 03508 | 1N5624 |
| CR49 | 152-0198-00 | | SEMICONV DEVICE:SILICON,200V,3A | 03508 | 1N5624 |
| CR111 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR121 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR136 | 152-0269-01 | | SEMICONV DEVICE:VVC,SI,33PF,5%,35V | 80009 | 152-0269-01 |
| CR166 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR167 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR207 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR229 | 152-0269-01 | | SEMICONV DEVICE:VVC,SI,33PF,5%,35V | 80009 | 152-0269-01 |
| CR250 | 152-0141-00 | B020000 | SEMICONV DEVICE:SILICON,30V,150MA | 80009 | 152-0141-00 |
| CR288 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR306 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR309 | 152-0269-01 | | SEMICONV DEVICE:VVC,SI,33PF,5%,35V | 80009 | 152-0269-01 |
| CR311 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR315 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR326 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR327 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR360 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR362 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR422 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR423 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR433 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR438 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR442 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR444 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR447 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR448 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR457 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR659 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR668 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR669 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR687 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR688 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR689 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR709 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR718 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR719 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR729 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR749 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR759 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR761 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR762 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR793 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR803 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR900 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR901 | 152-0141-02 | | SEMICONV DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|-------------------------------------|---|-------------|-----------------|
| CR902 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR903 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR904 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR913 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR914 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR915 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR916 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR917 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR919 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR923 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR924 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR925 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR928 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1043 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1057 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1140 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1143 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1229 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1233 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1236 | 152-0536-00 | | SEMICON D DEVICE:SILICON,HOT CARRIER,4V | 80009 | 152-0536-00 |
| CR1246 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1249 | 152-0536-00 | | SEMICON D DEVICE:SILICON,HOT CARRIER,4V | 80009 | 152-0536-00 |
| CR1254 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1257 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1285 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1294 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1295 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1298 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1310 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1313 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1319 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1362 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1366 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1372 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1376 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1377 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1386 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1396 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1506 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1516 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1520 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1521 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| CR1531 | 152-0141-02 | | SEMICON D DEVICE:SILICON,30V,150MA | 01295 | 1N4152R |
| DS96 | 150-1014-00 | | LAMP,LED:RED,50MA | 58361 | Q6444/MV5054-1 |
| DS97 | 150-1014-00 | | LAMP,LED:RED,50MA | 58361 | Q6444/MV5054-1 |
| DS98 | 150-1017-00 | | LT EMITTING DIO:GREEN,550NM,55MA MAX | 50437 | LSM-16L-100 |
| DS1044 | 150-1036-00 | | LAMP,LED:RED,3.0V,40MA | 01295 | TIL 209A |
| DS1054 | 150-1036-00 | | LAMP,LED:RED,3.0V,40MA | 01295 | TIL 209A |
| F1 | 159-0023-00 | | FUSE,CARTRIDGE:3AG,2A,250V,5 SEC | 71400 | MDX2 |
| F3 | 159-0005-00 | | FUSE,CARTRIDGE:3AG,3A,125V,30 SEC,CER | 71400 | MDA3 |
| F5 | 159-0005-00 | | FUSE,CARTRIDGE:3AG,3A,125V,30 SEC,CER | 71400 | MDA3 |
| F7 | 159-0023-00 | | FUSE,CARTRIDGE:3AG,2A,250V,5 SEC | 71400 | MDX2 |

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| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|-------------------------------------|--|-------------|-----------------|
| F98 | 159-0032-00 | | FUSE,CARTRIDGE:3AG,0.5A,250V,SLOW-BLOW | 71400 | MDL 1/2 |
| FL98 | 119-0389-00 | | FILTER,RAD INTE:115/230V,3A | 02777 | F11935-3 |
| L207 | 108-0561-00 | | COIL,RF:3.75UH | 80009 | 108-0561-00 |
| L289 | 108-0088-00 | | COIL,RF:FIXED,3.35UH | 80009 | 108-0088-00 |
| L351 | 108-0226-00 | | COIL,RF:100UH | 76493 | DWG B4257 |
| L490 | 114-0343-00 | | COIL,RF:200-400UH,CORE 276-0568-00 | 80009 | 114-0343-00 |
| L496 | 114-0343-00 | | COIL,RF:200-400UH,CORE 276-0568-00 | 80009 | 114-0343-00 |
| L497 | 108-0443-00 | | COIL,RF:25UH | 80009 | 108-0443-00 |
| L513 | 114-0303-00 | | COIL,RF:6.5-23UH,CORE 276-0506-00 | 80009 | 114-0303-00 |
| L516 | 114-0343-00 | | COIL,RF:200-400UH,CORE 276-0568-00 | 80009 | 114-0343-00 |
| L520 | 114-0343-00 | | COIL,RF:200-400UH,CORE 276-0568-00 | 80009 | 114-0343-00 |
| L523 | 114-0303-00 | | COIL,RF:6.5-23UH,CORE 276-0506-00 | 80009 | 114-0303-00 |
| L548 | 108-0317-00 | | COIL,RF:FIXED,15UH | 32159 | 71501M |
| L587 | 114-0280-00 | | COIL,RF:12-43UH,CORE 276-0568-00 | 80009 | 114-0280-00 |
| L607 | 114-0280-00 | | COIL,RF:12-43UH,CORE 276-0568-00 | 80009 | 114-0280-00 |
| L636 | 108-0056-00 | | COIL,RF:1.2UH | 80009 | 108-0056-00 |
| L637 | 108-0056-00 | | COIL,RF:1.2UH | 80009 | 108-0056-00 |
| L646 | 114-0222-00 | | COIL,RF:2-6UH,CORE 276-0568-00 | 80009 | 114-0222-00 |
| L648 | 108-0056-00 | | COIL,RF:1.2UH | 80009 | 108-0056-00 |
| L666 | 114-0220-00 | | COIL,RF:1-3UH,CORE 276-0568-00 | 80009 | 114-0220-00 |
| L686 | 114-0222-00 | | COIL,RF:2-6UH,CORE 276-0568-00 | 80009 | 114-0222-00 |
| L706 | 114-0220-00 | | COIL,RF:1-3UH,CORE 276-0568-00 | 80009 | 114-0220-00 |
| L726 | 114-0222-00 | | COIL,RF:2-6UH,CORE 276-0568-00 | 80009 | 114-0222-00 |
| L746 | 114-0220-00 | | COIL,RF:1-3UH,CORE 276-0568-00 | 80009 | 114-0220-00 |
| L797 | 114-0222-00 | | COIL,RF:2-6UH,CORE 276-0568-00 | 80009 | 114-0222-00 |
| L816 | 114-0220-00 | | COIL,RF:1-3UH,CORE 276-0568-00 | 80009 | 114-0220-00 |
| L971 | 108-0056-00 | | COIL,RF:1.2UH | 80009 | 108-0056-00 |
| L972 | 108-0056-00 | | COIL,RF:1.2UH | 80009 | 108-0056-00 |
| L1161 | 108-0878-00 | | COIL,RF:FIXED,164UH,POT CORE | 80009 | 108-0878-00 |
| L1191 | 108-0880-00 | | COIL,RF:FIXED,96.6UH,POT CORE | 80009 | 108-0880-00 |
| L1211 | 108-0879-00 | | COIL,RF:FIXED,20.5UH,POT CORE | 80009 | 108-0879-00 |
| L1281 | 108-0184-00 | | COIL,RF:3.2UH(WOUND ON A 10 OHM RES | 80009 | 108-0184-00 |
| L1287 | 108-0184-00 | | COIL,RF:3.2UH(WOUND ON A 10 OHM RES | 80009 | 108-0184-00 |
| L1335 | 114-0280-00 | | COIL,RF:12-43UH,CORE 276-0568-00 | 80009 | 114-0280-00 |
| L1336 | 114-0280-00 | | COIL,RF:12-43UH,CORE 276-0568-00 | 80009 | 114-0280-00 |
| L1337 | 114-0280-00 | | COIL,RF:12-43UH,CORE 276-0568-00 | 80009 | 114-0280-00 |
| L1403 | 108-0877-00 | | COIL,RF:FIXED,13UH,POT CORE | 80009 | 108-0877-00 |
| L1467 | 114-0280-00 | | COIL,RF:12-43UH,CORE 276-0568-00 | 80009 | 114-0280-00 |
| L1475 | 114-0280-00 | | COIL,RF:12-43UH,CORE 276-0568-00 | 80009 | 114-0280-00 |
| L1478 | 108-0056-00 | | COIL,RF:1.2UH | 80009 | 108-0056-00 |
| L1485 | 114-0280-00 | | COIL,RF:12-43UH,CORE 276-0568-00 | 80009 | 114-0280-00 |
| L1488 | 108-0056-00 | | COIL,RF:1.2UH | 80009 | 108-0056-00 |
| L1495 | 114-0278-00 | | COIL,RF:4.6-16.7UH,CORE 276-0568-00 | 80009 | 114-0278-00 |
| L1532 | 114-0254-00 | | COIL,RF:30-60UH,CORE NOT REPLACEABL | 80009 | 114-0254-00 |
| L1534 | 114-0280-00 | | COIL,RF:12-43UH,CORE 276-0568-00 | 80009 | 114-0280-00 |
| L1562 | 114-0278-00 | | COIL,RF:4.6-16.7UH,CORE 276-0568-00 | 80009 | 114-0278-00 |
| L1564 | 114-0278-00 | | COIL,RF:4.6-16.7UH,CORE 276-0568-00 | 80009 | 114-0278-00 |
| Q3 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q5 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q7 | 151-0188-00 | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q9 | 151-0134-00 | | TRANSISTOR:SILICON,PNP | 80009 | 151-0134-00 |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Discont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|-------------------------|---------|--|-------------|-----------------|
| Q23 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q25 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q27 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q29 | 151-0134-00 | | | TRANSISTOR:SILICON,PNP | 80009 | 151-0134-00 |
| Q43 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q45 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q47 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q49 | 151-0134-00 | | | TRANSISTOR:SILICON,PNP | 80009 | 151-0134-00 |
| Q80 | 151-0349-00 | B010100 | B020428 | TRANSISTOR:SILICON,NPN,SEL FROM MJE280 | 04713 | SJE924 |
| Q80 | 151-0349-04 | B020429 | | TRANSISTOR:SILICON,NPN,SCREENED | 80009 | 151-0349-04 |
| Q91 | 151-0220-00 | | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q94 | 151-0207-00 | | | TRANSISTOR:SILICON,NPN | 03508 | X32D6191 |
| Q97 | 151-0349-00 | B010100 | B020428 | TRANSISTOR:SILICON,NPN,SEL FROM MJE280 | 04713 | SJE924 |
| Q97 | 151-0349-04 | B020429 | | TRANSISTOR:SILICON,NPN,SCREENED | 80009 | 151-0349-04 |
| Q99 | 151-0349-00 | B010100 | B020428 | TRANSISTOR:SILICON,NPN,SEL FROM MJE280 | 04713 | SJE924 |
| Q99 | 151-0349-04 | B020429 | | TRANSISTOR:SILICON,NPN,SCREENED | 80009 | 151-0349-04 |
| Q114 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q115 | 151-0164-00 | | | TRANSISTOR:SILICON,PNP | 01295 | SKB3334 |
| Q124 | 151-0435-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS8335 |
| Q129 | 151-0216-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS8803 |
| Q131 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q141 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q146 | 151-0220-00 | | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q147 | 151-0405-00 | B010100 | B020428 | TRANSISTOR:SILICON,NPN,SEL FROM MJE800 | 04713 | SJE943 |
| Q147 | 151-0405-02 | B020429 | | TRANSISTOR:SILICON,NPN,SCREENED | 80009 | 151-0405-02 |
| Q151 | 151-0223-00 | | | TRANSISTOR:SILICON,NPN | 04713 | SPS8026 |
| Q168 | 151-0220-00 | | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q169 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q179 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q187 | 151-0220-00 | | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q189 | 151-0223-00 | | | TRANSISTOR:SILICON,NPN | 04713 | SPS8026 |
| Q266 | 151-0417-00 | B010100 | B010179 | TRANSISTOR:SILICON,PNP | 07263 | S21766 |
| Q266 | 151-0220-00 | B010180 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q268 | 151-0402-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM 3571TP | 80009 | 151-0402-00 |
| Q269 | 151-0402-00 | B010100 | B019999 | TRANSISTOR:SILICON,NPN,SEL FROM 3571TP | 80009 | 151-0402-00 |
| Q276 | 151-0417-00 | B010100 | B010179 | TRANSISTOR:SILICON,PNP | 07263 | S21766 |
| Q276 | 151-0220-00 | B010180 | B019999 | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q278 | 151-0402-00 | B010100 | B019999 | TRANSISTOR:SILICON,NPN,SEL FROM 3571TP | 80009 | 151-0402-00 |
| Q279 | 151-0402-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM 3571TP | 80009 | 151-0402-00 |
| Q288 | 151-0417-00 | B010100 | B010179 | TRANSISTOR:SILICON,PNP | 07263 | S21766 |
| Q288 | 151-0220-00 | B010180 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q289 | 151-0417-00 | B010100 | B010179 | TRANSISTOR:SILICON,PNP | 07263 | S21766 |
| Q289 | 151-0220-00 | B010180 | B019999 | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q298 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q305 | 151-0223-00 | | | TRANSISTOR:SILICON,NPN | 04713 | SPS8026 |
| Q313 | 151-0223-00 | | | TRANSISTOR:SILICON,NPN | 04713 | SPS8026 |
| Q315 | 151-0223-00 | | | TRANSISTOR:SILICON,NPN | 04713 | SPS8026 |
| Q316 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q321 | 151-0221-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS246 |
| Q325 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q327 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q331 | 151-0221-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS246 |
| Q345 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q361 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |

Replaceable Electrical Parts—143

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|--|-------------|-----------------|
| Q371 | 151-0410-00 | | TRANSISTOR:SILICON,PNP | 80009 | 151-0410-00 |
| Q390 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q392 | 151-0188-00 | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q394 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q402 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q404 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q459 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q469 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q479 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q481 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q482 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q553 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q556 | 151-0188-00 | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q557 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q569 | 151-0302-00 | | TRANSISTOR:SILICON,NPN | 07263 | S038487 |
| Q579 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q589 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q608 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q618 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q619 | 151-0302-00 | | TRANSISTOR:SILICON,NPN | 07263 | S038487 |
| Q653 | 151-0103-00 | | TRANSISTOR:SILICON,NPN | 80009 | 151-0103-00 |
| Q658 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q662 | 151-0220-00 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q663 | 151-0460-00 | | TRANSISTOR:SILICON,NPN | 07263 | S039652 |
| Q664 | 151-0459-00 | | TRANSISTOR:SILICON,PNP | 80009 | 151-0459-00 |
| Q668 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q678 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q683 | 151-0103-00 | | TRANSISTOR:SILICON,NPN | 80009 | 151-0103-00 |
| Q688 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q692 | 151-0220-00 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q703 | 151-0460-00 | | TRANSISTOR:SILICON,NPN | 07263 | S039652 |
| Q704 | 151-0459-00 | | TRANSISTOR:SILICON,PNP | 80009 | 151-0459-00 |
| Q718 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q723 | 151-0103-00 | | TRANSISTOR:SILICON,NPN | 80009 | 151-0103-00 |
| Q733 | 151-0220-00 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q738 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q743 | 151-0460-00 | | TRANSISTOR:SILICON,NPN | 07263 | S039652 |
| Q748 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q758 | 151-0220-00 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q762 | 151-0188-00 | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q774 | 151-0459-00 | | TRANSISTOR:SILICON,PNP | 80009 | 151-0459-00 |
| Q779 | 151-0188-00 | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q789 | 151-0188-00 | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q794 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q804 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q813 | 151-0220-00 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q826 | 151-0459-00 | | TRANSISTOR:SILICON,PNP | 80009 | 151-0459-00 |
| Q827 | 151-0460-00 | | TRANSISTOR:SILICON,NPN | 07263 | S039652 |
| Q838 | 151-0220-00 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q847 | 151-0103-00 | | TRANSISTOR:SILICON,NPN | 80009 | 151-0103-00 |
| Q903 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q911 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q912 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q913 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|-------------------------|---------|--|-------------|-----------------|
| Q914 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q915 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q916 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q917 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q918 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q919 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q923 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q928 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q929 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q932 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q933 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q934 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q935 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q936 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q937 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q938 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q939 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q947 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q948 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q954 | 151-0134-00 | | | TRANSISTOR:SILICON,PNP | 80009 | 151-0134-00 |
| Q1003 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q1012 | 151-0192-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q1015 | 151-0216-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS8803 |
| Q1032 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1047 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1053 | 151-0121-00 | | | TRANSISTOR:SILICON,NPN | 04713 | SM7769 |
| Q1124 | 151-0223-00 | | | TRANSISTOR:SILICON,NPN | 04713 | SPS8026 |
| Q1131 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1132 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1134 | 151-0223-00 | | | TRANSISTOR:SILICON,NPN | 04713 | SPS8026 |
| Q1140 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1141 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1142 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1205 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q1215 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q1235 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1236 | 151-0367-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM 3571TP | 01295 | SKA6516 |
| Q1237 | 151-0367-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM 3571TP | 01295 | SKA6516 |
| Q1238 | 151-0369-00 | B010100 | B020428 | TRANSISTOR:SILICON,PNP | 01295 | SKA6664 |
| Q1238 | 151-0369-02 | B020429 | | TRANSISTOR:SILICON,PNP,SCREENED | 80009 | 151-0369-02 |
| Q1244 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1251 | 151-1030-00 | | | TRANSISTOR: | 02735 | 3N138 |
| Q1254 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1265 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q1268 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1282 | 151-1006-00 | | | TRANSISTOR:SILICON,JFE,N-CHANNEL | 17856 | FN686 |
| Q1289 | 151-0369-00 | B010100 | B020428 | TRANSISTOR:SILICON,PNP | 01295 | SKA6664 |
| Q1289 | 151-0369-02 | B020429 | | TRANSISTOR:SILICON,PNP,SCREENED | 80009 | 151-0369-02 |
| Q1299 | 151-0367-00 | | | TRANSISTOR:SILICON,NPN,SEL FROM 3571TP | 01295 | SKA6516 |
| Q1301 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q1305 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1306 | 151-0188-00 | | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1309 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q1312 | 151-0190-00 | | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |

Replaceable Electrical Parts—143

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|--|-------------|------------------|
| Q1313 | 151-0459-00 | | TRANSISTOR:SILICON,PNP | 80009 | 151-0459-00 |
| Q1333 | 151-0188-00 | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1372 | 151-0188-00 | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1380 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q1387 | 151-0188-00 | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1392 | 151-0188-00 | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1415 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q1416 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q1426 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q1439 | 151-0220-00 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q1458 | 151-0103-00 | | TRANSISTOR:SILICON,NPN | 80009 | 151-0103-00 |
| Q1503 | 151-0188-00 | | TRANSISTOR:SILICON,PNP | 04713 | SPS6868K |
| Q1522 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q1531 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q1538 | 151-0103-00 | | TRANSISTOR:SILICON,NPN | 80009 | 151-0103-00 |
| Q1548 | 151-0220-00 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q1552 | 151-0220-00 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q1558 | 151-0190-00 | | TRANSISTOR:SILICON,NPN | 07263 | S032677 |
| Q1561 | 151-0192-00 | | TRANSISTOR:SILICON,NPN,SEL FROM MPS652 | 04713 | SPS8801 |
| Q1568 | 151-0220-00 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| Q1578 | 151-0220-00 | | TRANSISTOR:SILICON,PNP | 07263 | S036228 |
| R1 | 315-0241-00 | | RES.,FXD,CMPSN:240 OHM,5%,0.25W | 01121 | CB2415 |
| R2 | 311-1228-00 | | RES.,VAR,NONWIR:10K OHM,20%,0.50W | 32997 | 3386F-T04-103 |
| R3 | 308-0463-00 | | RES.,FXD,WW:0.3 OHM,1%,3W | 91637 | RS2B-KR3000F |
| R7 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R8 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R10 | 321-0197-00 | | RES.,FXD,FILM:1.1K OHM,1%,0.125W | 91637 | MFF1816G11000F |
| R11 | 315-0752-00 | | RES.,FXD,CMPSN:7.5K OHM,5%,0.25W | 01121 | CB7525 |
| R12 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R15 | 321-0189-00 | | RES.,FXD,FILM:909 OHM,1%,0.125W | 91637 | MFF1816G909R0F |
| R16 | 315-0431-00 | | RES.,FXD,CMPSN:430 OHM,5%,0.25W | 01121 | CB4315 |
| R17 | 315-0471-00 | | RES.,FXD,CMPSN:470 OHM,5%,0.25W | 01121 | CB4715 |
| R18 | 315-0751-00 | | RES.,FXD,CMPSN:750 OHM,5%,0.25W | 01121 | CB7515 |
| R20 | 321-0264-00 | | RES.,FXD,FILM:5.49K OHM,1%,0.125W | 91637 | MFF1816G54900F |
| R21 | 311-1228-00 | | RES.,VAR,NONWIR:10K OHM,20%,0.50W | 32997 | 3386F-T04-103 |
| R22 | 321-0224-00 | | RES.,FXD,FILM:2.1K OHM,1%,0.125W | 91637 | MFF1816G21000F |
| R23 | 315-0822-00 | | RES.,FXD,CMPSN:8.2K OHM,5%,0.25W | 01121 | CB8225 |
| R24 | 308-0245-00 | | RES.,FXD,WW:0.6 OHM,5%,2W | 91637 | CW2B30 0.60HM 5% |
| R25 | 321-0189-00 | | RES.,FXD,FILM:909 OHM,1%,0.125W | 91637 | MFF1816G909R0F |
| R26 | 315-0431-00 | | RES.,FXD,CMPSN:430 OHM,5%,0.25W | 01121 | CB4315 |
| R27 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R28 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R30 | 315-0301-00 | | RES.,FXD,CMPSN:300 OHM,5%,0.25W | 01121 | CB3015 |
| R31 | 315-0431-00 | | RES.,FXD,CMPSN:430 OHM,5%,0.25W | 01121 | CB4315 |
| R32 | 321-0189-00 | | RES.,FXD,FILM:909 OHM,1%,0.125W | 91637 | MFF1816G909R0F |
| R33 | 315-0471-00 | | RES.,FXD,CMPSN:470 OHM,5%,0.25W | 01121 | CB4715 |
| R34 | 321-0172-00 | | RES.,FXD,FILM:604 OHM,1%,0.125W | 91637 | MFF1816G604R0F |
| R36 | 315-0152-00 | | RES.,FXD,CMPSN:1.5K OHM,5%,0.25W | 01121 | CB1525 |
| R37 | 315-0182-00 | | RES.,FXD,CMPSN:1.8K OHM,5%,0.25W | 01121 | CB1825 |
| R38 | 315-0471-00 | | RES.,FXD,CMPSN:470 OHM,5%,0.25W | 01121 | CB4715 |
| R39 | 321-0173-00 | | RES.,FXD,FILM:619 OHM,1%,0.125W | 91637 | MFF1816G619R0F |
| R40 | 311-1228-00 | | RES.,VAR,NONWIR:10K OHM,20%,0.50W | 32997 | 3386F-T04-103 |
| R41 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|------------------------------------|-------------|-----------------|
| R43 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R44 | 308-0499-00 | | RES.,FXD,WW:0.5 OHM,10%,2.5W AXIAL | 91637 | RS2B-ER5000K |
| R46 | 315-0301-00 | | RES.,FXD,CMPSN:300 OHM,5%,0.25W | 01121 | CB3015 |
| R47 | 315-0331-00 | | RES.,FXD,CMPSN:330 OHM,5%,0.25W | 01121 | CB3315 |
| R48 | 315-0392-00 | | RES.,FXD,CMPSN:3.9K OHM,5%,0.25W | 01121 | CB3925 |
| R49 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R81 | 311-0546-00 | | RES.,VAR,NONWIR:10K OHM,20%,0.75W | 80009 | 311-0546-00 |
| R82 | 315-0113-00 | | RES.,FXD,CMPSN:11K OHM,5%,0.25W | 01121 | CB1135 |
| R83 | 315-0203-00 | | RES.,FXD,CMPSN:20K OHM,5%,0.25W | 01121 | CB2035 |
| R88 | 315-0153-00 | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R92 | 315-0202-00 | | RES.,FXD,CMPSN:2K OHM,5%,0.25W | 01121 | CB2025 |
| R93 | 315-0203-00 | | RES.,FXD,CMPSN:20K OHM,5%,0.25W | 01121 | CB2035 |
| R94 | 315-0203-00 | | RES.,FXD,CMPSN:20K OHM,5%,0.25W | 01121 | CB2035 |
| R95 | 315-0473-00 | | RES.,FXD,CMPSN:47K OHM,5%,0.25W | 01121 | CB4735 |
| R96 | 311-1833-00 | | RES.,VAR,NONWIR:50K OHM,10%,0.50W | 01121 | 73A1G040L503A |
| R97 | 311-0580-00 | | RES.,VAR,NONWIR:50K OHM,20%,0.50W | 11237 | 300SF-41695 |
| R98 | 311-0580-00 | | RES.,VAR,NONWIR:50K OHM,20%,0.50W | 11237 | 300SF-41695 |
| R102 | 315-0242-00 | | RES.,FXD,CMPSN:2.4K OHM,5%,0.25W | 01121 | CB2425 |
| R103 | 315-0203-00 | | RES.,FXD,CMPSN:20K OHM,5%,0.25W | 01121 | CB2035 |
| R105 | 311-1230-00 | | RES.,VAR,NONWIR:20K OHM,20%,0.50W | 32997 | 3386F-T04-203 |
| R111 | 321-0289-00 | | RES.,FXD,FILM:10K OHM,1%,0.125W | 91637 | MFF1816G10001F |
| R113 | 315-0623-00 | | RES.,FXD,CMPSN:62K OHM,5%,0.25W | 01121 | CB6235 |
| R115 | 315-0473-00 | | RES.,FXD,CMPSN:47K OHM,5%,0.25W | 01121 | CB4735 |
| R118 | 308-0788-00 | | RES.,FXD,WW:20 OHM,5%,1W | 75042 | BW-20F-20R00J |
| R120 | 321-0262-00 | | RES.,FXD,FILM:5.23K OHM,1%,0.125W | 91637 | MFF1816G52300F |
| R121 | 315-0272-00 | | RES.,FXD,CMPSN:2.7K OHM,5%,0.25W | 01121 | CB2725 |
| R123 | 315-0822-00 | | RES.,FXD,CMPSN:8.2K OHM,5%,0.25W | 01121 | CB8225 |
| R124 | 315-0153-00 | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R125 | 315-0153-00 | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R127 | 321-0201-00 | | RES.,FXD,FILM:1.21K OHM,1%,0.125W | 91637 | MFF1816G12100F |
| R132 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R133 | 315-0105-00 | | RES.,FXD,CMPSN:1M OHM,5%,0.25W | 01121 | CB1055 |
| R135 | 315-0153-00 | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R136 | 315-0201-00 | | RES.,FXD,CMPSN:200 OHM,5%,0.25W | 01121 | CB2015 |
| R137 | 321-0193-00 | | RES.,FXD,FILM:1K OHM,1%,0.125W | 91637 | MFF1816G10000F |
| R138 | 321-0271-00 | | RES.,FXD,FILM:6.49K OHM,1%,0.125W | 91637 | MFF1816G64900F |
| R143 | 321-0242-00 | | RES.,FXD,FILM:3.24K OHM,1%,0.125W | 91637 | MFF1816G32400F |
| R145 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R148 | 321-0354-00 | | RES.,FXD,FILM:47.5K OHM,1%,0.125W | 91637 | MFF1816G47501F |
| R151 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R153 | 311-1227-00 | | RES.,VAR,NONWIR:5K OHM,20%,0.50W | 32997 | 3386F-T04-502 |
| R155 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R156 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R157 | 321-0262-00 | | RES.,FXD,FILM:5.23K OHM,1%,0.125W | 91637 | MFF1816G52300F |
| R158 | 321-0260-00 | | RES.,FXD,FILM:4.99K OHM,1%,0.125W | 91637 | MFF1816G49900F |
| R161 | 315-0153-00 | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R165 | 315-0512-00 | | RES.,FXD,CMPSN:5.1K OHM,5%,0.25W | 01121 | CB5125 |
| R167 | 321-0289-00 | | RES.,FXD,FILM:10K OHM,1%,0.125W | 91637 | MFF1816G10001F |
| R176 | 315-0512-00 | | RES.,FXD,CMPSN:5.1K OHM,5%,0.25W | 01121 | CB5125 |
| R177 | 315-0113-00 | | RES.,FXD,CMPSN:11K OHM,5%,0.25W | 01121 | CB1135 |
| R178 | 315-0272-00 | | RES.,FXD,CMPSN:2.7K OHM,5%,0.25W | 01121 | CB2725 |
| R179 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R186 | 315-0201-00 | | RES.,FXD,CMPSN:200 OHM,5%,0.25W | 01121 | CB2015 |
| R187 | 315-0511-00 | | RES.,FXD,CMPSN:510 OHM,5%,0.25W | 01121 | CB5115 |

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| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Discont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|-------------------------|---------|-----------------------------------|-------------|-----------------|
| R188 | 315-0202-00 | | | RES.,FXD,CMPSN:2K OHM,5%,0.25W | 01121 | CB2025 |
| R189 | 315-0103-00 | | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R197 | 315-0101-00 | | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R198 | 315-0242-00 | | | RES.,FXD,CMPSN:2.4K OHM,5%,0.25W | 01121 | CB2425 |
| R199 | 315-0623-00 | | | RES.,FXD,CMPSN:62K OHM,5%,0.25W | 01121 | CB6235 |
| R202 | 315-0103-00 | | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R207 | 315-0103-00 | | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R208 | 315-0153-00 | | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R209 | 315-0104-00 | | | RES.,FXD,CMPSN:100K OHM,5%,0.25W | 01121 | CB1045 |
| R217 | 315-0103-00 | | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R219 | 315-0105-00 | | | RES.,FXD,CMPSN:1M OHM,5%,0.25W | 01121 | CB1055 |
| R227 | 315-0511-00 | | | RES.,FXD,CMPSN:510 OHM,5%,0.25W | 01121 | CB5115 |
| R228 | 315-0101-00 | | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R229 | 315-0822-00 | | | RES.,FXD,CMPSN:8.2K OHM,5%,0.25W | 01121 | CB8225 |
| R235 | 315-0103-00 | | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R247 | 315-0181-00 | B010100 | B019999 | RES.,FXD,CMPSN:180 OHM,5%,0.25W | 01121 | CB1815 |
| R248 | 315-0181-00 | | | RES.,FXD,CMPSN:180 OHM,5%,0.25W | 01121 | CB1815 |
| R257 | 315-0181-00 | | | RES.,FXD,CMPSN:180 OHM,5%,0.25W | 01121 | CB1815 |
| R258 | 315-0181-00 | B010100 | B019999 | RES.,FXD,CMPSN:180 OHM,5%,0.25W | 01121 | CB1815 |
| R259 | 315-0470-00 | B010100 | B019999 | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R266 | 315-0150-00 | B010100 | B019999 | RES.,FXD,CMPSN:15 OHM,5%,0.25W | 01121 | CB1505 |
| R267 | 315-0150-00 | | | RES.,FXD,CMPSN:15 OHM,5%,0.25W | 01121 | CB1505 |
| R268 | 315-0150-00 | B010100 | B019999 | RES.,FXD,CMPSN:15 OHM,5%,0.25W | 01121 | CB1505 |
| R270 | 315-0102-00 | | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R277 | 315-0150-00 | | | RES.,FXD,CMPSN:15 OHM,5%,0.25W | 01121 | CB1505 |
| R278 | 315-0103-00 | | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R279 | 315-0470-00 | | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R286 | 315-0102-00 | | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R287 | 315-0121-00 | | | RES.,FXD,CMPSN:120 OHM,5%,0.25W | 01121 | CB1215 |
| R288 | 315-0101-00 | | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R289 | 315-0103-00 | | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R292 | 315-0103-00 | | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R298 | 315-0511-00 | | | RES.,FXD,CMPSN:510 OHM,5%,0.25W | 01121 | CB5115 |
| R302 | 315-0103-00 | | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R304 | 315-0100-00 | B010100 | B019999 | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R305 | 315-0303-00 | | | RES.,FXD,CMPSN:30K OHM,5%,0.25W | 01121 | CB3035 |
| R306 | 315-0333-00 | | | RES.,FXD,CMPSN:33K OHM,5%,0.25W | 01121 | CB3335 |
| R308 | 315-0511-00 | | | RES.,FXD,CMPSN:510 OHM,5%,0.25W | 01121 | CB5115 |
| R310 | 315-0124-00 | | | RES.,FXD,CMPSN:120K OHM,5%,0.25W | 01121 | CB1245 |
| R311 | 315-0104-00 | | | RES.,FXD,CMPSN:100K OHM,5%,0.25W | 01121 | CB1045 |
| R312 | 315-0224-00 | | | RES.,FXD,CMPSN:220K OHM,5%,0.25W | 01121 | CB2245 |
| R313 | 315-0623-00 | | | RES.,FXD,CMPSN:62K OHM,5%,0.25W | 01121 | CB6235 |
| R314 | 315-0472-00 | | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R316 | 315-0303-00 | | | RES.,FXD,CMPSN:30K OHM,5%,0.25W | 01121 | CB3035 |
| R317 | 315-0102-00 | | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R318 | 315-0332-00 | | | RES.,FXD,CMPSN:3.3K OHM,5%,0.25W | 01121 | CB3325 |
| R319 | 315-0104-00 | | | RES.,FXD,CMPSN:100K OHM,5%,0.25W | 01121 | CB1045 |
| R321 | 315-0102-00 | | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R322 | 321-0318-00 | | | RES.,FXD,FILM:20K OHM,1%,0.125W | 91637 | MFF1816G20001F |
| R326 | 321-0298-00 | | | RES.,FXD,FILM:12.4K OHM,1%,0.125W | 91637 | MFF1816G12401F |
| R327 | 321-0222-00 | | | RES.,FXD,FILM:2K OHM,1%,0.125W | 91637 | MFF1816G20000F |
| R328 | 315-0683-00 | | | RES.,FXD,CMPSN:68K OHM,5%,0.25W | 01121 | CB6835 |
| R330 | 315-0272-00 | | | RES.,FXD,CMPSN:2.7K OHM,5%,0.25W | 01121 | CB2725 |
| R331 | 315-0101-00 | | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|-------------------------------------|-----------------------------------|-------------|-----------------|
| R332 | 315-0153-00 | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R333 | 315-0153-00 | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R336 | 321-0270-00 | | RES.,FXD,FILM:6.34K OHM,1%,0.125W | 91637 | MFF1816G63400F |
| R337 | 321-0231-00 | | RES.,FXD,FILM:2.49K OHM,1%,0.125W | 91637 | MFF1816G24900F |
| R338 | 315-0202-00 | | RES.,FXD,CMPSN:2K OHM,5%,0.25W | 01121 | CB2025 |
| R342 | 311-1232-00 | | RES.,VAR,NONWIR:50K OHM,20%,0.50W | 32997 | 3386F-T04-503 |
| R343 | 315-0242-00 | | RES.,FXD,CMPSN:2.4K OHM,5%,0.25W | 01121 | CB2425 |
| R345 | 321-0293-00 | | RES.,FXD,FILM:11K OHM,1%,0.125W | 91637 | MFF1816G11001F |
| R351 | 321-0259-00 | | RES.,FXD,FILM:4.87K OHM,1%,0.125W | 91637 | MFF1816G48700F |
| R357 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R361 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R362 | 321-0426-00 | | RES.,FXD,FILM:267K OHM,1%,0.125W | 91637 | MFF1816G26702F |
| R370 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R371 | 315-0753-00 | | RES.,FXD,CMPSN:75K OHM,5%,0.25W | 01121 | CB7535 |
| R372 | 321-0331-00 | | RES.,FXD,FILM:27.4K OHM,1%,0.125W | 91637 | MFF1816G27401F |
| R373 | 315-0133-00 | | RES.,FXD,CMPSN:13K OHM,5%,0.25W | 01121 | CB1335 |
| R378 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R380 | 315-0222-00 | | RES.,FXD,CMPSN:2.2K OHM,5%,0.25W | 01121 | CB2225 |
| R381 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R382 | 315-0302-00 | | RES.,FXD,CMPSN:3K OHM,5%,0.25W | 01121 | CB3025 |
| R383 | 315-0242-00 | | RES.,FXD,CMPSN:2.4K OHM,5%,0.25W | 01121 | CB2425 |
| R384 | 315-0133-00 | | RES.,FXD,CMPSN:13K OHM,5%,0.25W | 01121 | CB1335 |
| R387 | 321-0353-00 | | RES.,FXD,FILM:46.4K OHM,1%,0.125W | 91637 | MFF1816G46401F |
| R388 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R389 | 321-0371-00 | | RES.,FXD,FILM:71.5K OHM,1%,0.125W | 91637 | MFF1816G71501F |
| R390 | 315-0301-00 | | RES.,FXD,CMPSN:300 OHM,5%,0.25W | 01121 | CB3015 |
| R392 | 315-0334-00 | | RES.,FXD,CMPSN:330K OHM,5%,0.25W | 01121 | CB3345 |
| R393 | 315-0152-00 | | RES.,FXD,CMPSN:1.5K OHM,5%,0.25W | 01121 | CB1525 |
| R394 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R398 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R399 | 315-0301-00 | | RES.,FXD,CMPSN:300 OHM,5%,0.25W | 01121 | CB3015 |
| R402 | 315-0220-00 | | RES.,FXD,CMPSN:22 OHM,5%,0.25W | 01121 | CB2205 |
| R403 | 315-0153-00 | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R404 | 315-0302-00 | | RES.,FXD,CMPSN:3K OHM,5%,0.25W | 01121 | CB3025 |
| R406 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R409 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R410 | 315-0222-00 | | RES.,FXD,CMPSN:2.2K OHM,5%,0.25W | 01121 | CB2225 |
| R413 | 315-0223-00 | | RES.,FXD,CMPSN:22K OHM,5%,0.25W | 01121 | CB2235 |
| R414 | 315-0821-00 | | RES.,FXD,CMPSN:820 OHM,5%,0.25W | 01121 | CB8215 |
| R416 | 315-0223-00 | | RES.,FXD,CMPSN:22K OHM,5%,0.25W | 01121 | CB2235 |
| R417 | 315-0752-00 | | RES.,FXD,CMPSN:7.5K OHM,5%,0.25W | 01121 | CB7525 |
| R422 | 315-0153-00 | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R423 | 315-0512-00 | | RES.,FXD,CMPSN:5.1K OHM,5%,0.25W | 01121 | CB5125 |
| R424 | 315-0121-00 | | RES.,FXD,CMPSN:120 OHM,5%,0.25W | 01121 | CB1215 |
| R426 | 315-0223-00 | | RES.,FXD,CMPSN:22K OHM,5%,0.25W | 01121 | CB2235 |
| R427 | 315-0151-00 | | RES.,FXD,CMPSN:150 OHM,5%,0.25W | 01121 | CB1515 |
| R428 | 315-0752-00 | | RES.,FXD,CMPSN:7.5K OHM,5%,0.25W | 01121 | CB7525 |
| R430 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R432 | 315-0203-00 | | RES.,FXD,CMPSN:20K OHM,5%,0.25W | 01121 | CB2035 |
| R433 | 315-0303-00 | | RES.,FXD,CMPSN:30K OHM,5%,0.25W | 01121 | CB3035 |
| R434 | 315-0222-00 | | RES.,FXD,CMPSN:2.2K OHM,5%,0.25W | 01121 | CB2225 |
| R436 | 315-0151-00 | | RES.,FXD,CMPSN:150 OHM,5%,0.25W | 01121 | CB1515 |
| R440 | 315-0183-00 | | RES.,FXD,CMPSN:18K OHM,5%,0.25W | 01121 | CB1835 |
| R446 | 315-0622-00 | | RES.,FXD,CMPSN:6.2K OHM,5%,0.25W | 01121 | CB6225 |

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| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|-----------------------------------|-------------|-----------------|
| R448 | 315-0751-00 | | RES.,FXD,CMPSN:750 OHM,5%,0.25W | 01121 | CB7515 |
| R450 | 315-0223-00 | | RES.,FXD,CMPSN:22K OHM,5%,0.25W | 01121 | CB2235 |
| R452 | 315-0222-00 | | RES.,FXD,CMPSN:2.2K OHM,5%,0.25W | 01121 | CB2225 |
| R456 | 315-0153-00 | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R457 | 311-1228-00 | | RES.,VAR,NONWIR:10K OHM,20%,0.50W | 32997 | 3386F-T04-103 |
| R458 | 315-0183-00 | | RES.,FXD,CMPSN:18K OHM,5%,0.25W | 01121 | CB1835 |
| R459 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R460 | 315-0510-00 | | RES.,FXD,CMPSN:51 OHM,5%,0.25W | 01121 | CB5105 |
| R462 | 315-0153-00 | | RES.,FXD,CMPSN:15K OHM,5%,0.25W | 01121 | CB1535 |
| R468 | 315-0562-00 | | RES.,FXD,CMPSN:5.6K OHM,5%,0.25W | 01121 | CB5625 |
| R470 | 315-0512-00 | | RES.,FXD,CMPSN:5.1K OHM,5%,0.25W | 01121 | CB5125 |
| R472 | 315-0562-00 | | RES.,FXD,CMPSN:5.6K OHM,5%,0.25W | 01121 | CB5625 |
| R477 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R478 | 315-0473-00 | | RES.,FXD,CMPSN:47K OHM,5%,0.25W | 01121 | CB4735 |
| R479 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R481 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R482 | 315-0751-00 | | RES.,FXD,CMPSN:750 OHM,5%,0.25W | 01121 | CB7515 |
| R483 | 315-0471-00 | | RES.,FXD,CMPSN:470 OHM,5%,0.25W | 01121 | CB4715 |
| R487 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R488 | 315-0203-00 | | RES.,FXD,CMPSN:20K OHM,5%,0.25W | 01121 | CB2035 |
| R491 | 315-0471-00 | | RES.,FXD,CMPSN:470 OHM,5%,0.25W | 01121 | CB4715 |
| R492 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R494 | 315-0271-00 | | RES.,FXD,CMPSN:270 OHM,5%,0.25W | 01121 | CB2715 |
| R495 | 311-1231-00 | | RES.,VAR,NONWIR:25K OHM,20%,0.50W | 32997 | 3386F-T04-253 |
| R497 | 315-0911-00 | | RES.,FXD,CMPSN:910 OHM,5%,0.25W | 01121 | CB9115 |
| R498 | 321-0339-00 | | RES.,FXD,FILM:33.2K OHM,1%,0.125W | 91637 | MFF1816G33201F |
| R499 | 315-0512-00 | | RES.,FXD,CMPSN:5.1K OHM,5%,0.25W | 01121 | CB5125 |
| R501 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R502 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R508 | 315-0824-00 | | RES.,FXD,CMPSN:820K OHM,5%,0.25W | 01121 | CB8245 |
| R509 | 315-0154-00 | | RES.,FXD,CMPSN:150K OHM,5%,0.25W | 01121 | CB1545 |
| R511 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R512 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R515 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R518 | 315-0512-00 | | RES.,FXD,CMPSN:5.1K OHM,5%,0.25W | 01121 | CB5125 |
| R519 | 315-0512-00 | | RES.,FXD,CMPSN:5.1K OHM,5%,0.25W | 01121 | CB5125 |
| R522 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R523 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R526 | 315-0271-00 | | RES.,FXD,CMPSN:270 OHM,5%,0.25W | 01121 | CB2715 |
| R527 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R530 | 315-0303-00 | | RES.,FXD,CMPSN:30K OHM,5%,0.25W | 01121 | CB3035 |
| R531 | 315-0682-00 | | RES.,FXD,CMPSN:6.8K OHM,5%,0.25W | 01121 | CB6825 |
| R532 | 315-0303-00 | | RES.,FXD,CMPSN:30K OHM,5%,0.25W | 01121 | CB3035 |
| R536 | 315-0303-00 | | RES.,FXD,CMPSN:30K OHM,5%,0.25W | 01121 | CB3035 |
| R537 | 315-0272-00 | | RES.,FXD,CMPSN:2.7K OHM,5%,0.25W | 01121 | CB2725 |
| R540 | 315-0511-00 | | RES.,FXD,CMPSN:510 OHM,5%,0.25W | 01121 | CB5115 |
| R541 | 315-0822-00 | | RES.,FXD,CMPSN:8.2K OHM,5%,0.25W | 01121 | CB8225 |
| R542 | 315-0432-00 | | RES.,FXD,CMPSN:4.3K OHM,5%,0.25W | 01121 | CB4325 |
| R544 | 315-0202-00 | | RES.,FXD,CMPSN:2K OHM,5%,0.25W | 01121 | CB2025 |
| R546 | 315-0563-00 | | RES.,FXD,CMPSN:56K OHM,5%,0.25W | 01121 | CB5635 |
| R547 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R548 | 315-0391-00 | | RES.,FXD,CMPSN:390 OHM,5%,0.25W | 01121 | CB3915 |
| R549 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R551 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|--------------------------------------|-------------|-----------------|
| R552 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R554 | 311-1231-00 | | RES.,VAR,NONWIR:25K OHM,20%,0.50W | 32997 | 3386F-T04-253 |
| R555 | 315-0122-00 | | RES.,FXD,CMPSN:1.2K OHM,5%,0.25W | 01121 | CB1225 |
| R561 | 322-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.25W | 75042 | CEBT0-75R00F |
| R566 | 301-0821-00 | | RES.,FXD,CMPSN:820 OHM,5%,0.50W | 01121 | EB8215 |
| R567 | 315-0750-00 | | RES.,FXD,CMPSN:75 OHM,5%,0.25W | 01121 | CB7505 |
| R568 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R571 | 322-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.25W | 75042 | CEBT0-75R00F |
| R576 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R578 | 315-0242-00 | | RES.,FXD,CMPSN:2.4K OHM,5%,0.25W | 01121 | CB2425 |
| R581 | 322-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.25W | 75042 | CEBT0-75R00F |
| R587 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R588 | 321-0322-00 | | RES.,FXD,FILM:22.1K OHM,1%,0.125W | 91637 | MFF1816G22101F |
| R589 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R591 | 322-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.25W | 75042 | CEBT0-75R00F |
| R594 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R598 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R599 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R601 | 322-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.25W | 75042 | CEBT0-75R00F |
| R604 | 321-0250-00 | | RES.,FXD,FILM:3.92K OHM,1%,0.125W | 91637 | MFF1816G39200F |
| R605 | 321-0280-00 | | RES.,FXD,FILM:8.06K OHM,1%,0.125W | 91637 | MFF1816G80600F |
| R608 | 321-0322-00 | | RES.,FXD,FILM:22.1K OHM,1%,0.125W | 91637 | MFF1816G22101F |
| R609 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R611 | 322-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.25W | 75042 | CEBT0-75R00F |
| R614 | 321-0205-00 | | RES.,FXD,FILM:1.33K OHM,1%,0.125W | 91637 | MFF1816G13300F |
| R615 | 321-0274-00 | | RES.,FXD,FILM:6.98K OHM,1%,0.125W | 91637 | MFF1816G69800F |
| R616 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R618 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R619 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R621 | 322-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.25W | 75042 | CEBT0-75R00F |
| R626 | 315-0242-00 | | RES.,FXD,CMPSN:2.4K OHM,5%,0.25W | 01121 | CB2425 |
| R627 | 301-0821-00 | | RES.,FXD,CMPSN:820 OHM,5%,0.50W | 01121 | EB8215 |
| R628 | 315-0750-00 | | RES.,FXD,CMPSN:75 OHM,5%,0.25W | 01121 | CB7505 |
| R629 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R631 | 322-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.25W | 75042 | CEBT0-75R00F |
| R637 | 315-0220-00 | | RES.,FXD,CMPSN:22 OHM,5%,0.25W | 01121 | CB2205 |
| R639 | 315-0220-00 | | RES.,FXD,CMPSN:22 OHM,5%,0.25W | 01121 | CB2205 |
| R641 | 321-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.125W | 91637 | MFF1816G75R00F |
| R643 | 303-0821-00 | | RES.,FXD,CMPSN:820 OHM,5%,1W | 01121 | GB8215 |
| R652 | 311-1222-00 | | RES.,VAR,NONWIR:100 OHM,20%,0.50W | 32997 | 3386F-T04-101 |
| R653 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R654 | 315-0302-00 | | RES.,FXD,CMPSN:3K OHM,5%,0.25W | 01121 | CB3025 |
| R658 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R662 | 321-0193-00 | | RES.,FXD,FILM:1K OHM,1%,0.125W | 91637 | MFF1816G10000F |
| R663 | 321-0256-00 | | RES.,FXD,FILM:4.53K OHM,1%,0.125W | 91637 | MFF1816G45300F |
| R664 | 321-0251-00 | | RES.,FXD,FILM:4.02K OHM,1%,0.125W | 91637 | MFF1816G40200F |
| R665 | 321-0289-00 | | RES.,FXD,FILM:10K OHM,1%,0.125W | 91637 | MFF1816G10001F |
| R667 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R668 | 321-1329-03 | | RES.,FXD,FILM:26.4K OHM,0.25%,0.125W | 91637 | MFF1816D26401C |
| R669 | 321-0775-03 | | RES.,FXD,FILM:45K OHM,0.25%,0.125W | 91637 | MFF1816D45001C |
| R671 | 311-1224-00 | | RES.,VAR,NONWIR:500 OHM,20%,0.50W | 32997 | 3386F-T04-501 |
| R672 | 321-0241-00 | | RES.,FXD,FILM:3.16K OHM,1%,0.125W | 91637 | MFF1816G31600F |
| R673 | 321-0108-00 | | RES.,FXD,FILM:130 OHM,1%,0.125W | 91637 | MFF1816G130R0F |
| R674 | 315-0622-00 | | RES.,FXD,CMPSN:6.2K OHM,5%,0.25W | 01121 | CB6225 |

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| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|------------------------------------|-------------|-----------------|
| R678 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R679 | 321-0603-07 | | RES.,FXD,FILM:15K OHM,0.1%,0.125W | 91637 | MFF1816C15001B |
| R681 | 321-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.125W | 91637 | MFF1816G75R00F |
| R683 | 303-0821-00 | | RES.,FXD,CMPSN:820 OHM,5%,1W | 01121 | GB8215 |
| R688 | 315-0681-00 | | RES.,FXD,CMPSN:680 OHM,5%,0.25W | 01121 | CB6815 |
| R689 | 321-0775-03 | | RES.,FXD,FILM:45K OHM,0.25%,0.125W | 91637 | MFF1816D45001C |
| R691 | 311-1222-00 | | RES.,VAR,NONWIR:100 OHM,20%,0.50W | 32997 | 3386F-T04-101 |
| R693 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R694 | 315-0302-00 | | RES.,FXD,CMPSN:3K OHM,5%,0.25W | 01121 | CB3025 |
| R698 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R699 | 315-0681-00 | | RES.,FXD,CMPSN:680 OHM,5%,0.25W | 01121 | CB6815 |
| R701 | 321-0193-00 | | RES.,FXD,FILM:1K OHM,1%,0.125W | 91637 | MFF1816G10000F |
| R702 | 321-0256-00 | | RES.,FXD,FILM:4.53K OHM,1%,0.125W | 91637 | MFF1816G45300F |
| R704 | 321-0251-00 | | RES.,FXD,FILM:4.02K OHM,1%,0.125W | 91637 | MFF1816G40200F |
| R705 | 321-0289-00 | | RES.,FXD,FILM:10K OHM,1%,0.125W | 91637 | MFF1816G10001F |
| R709 | 315-0681-00 | | RES.,FXD,CMPSN:680 OHM,5%,0.25W | 01121 | CB6815 |
| R711 | 311-1224-00 | | RES.,VAR,NONWIR:500 OHM,20%,0.50W | 32997 | 3386F-T04-501 |
| R712 | 321-1249-00 | | RES.,FXD,FILM:3.88K OHM,1%,0.125W | 91637 | MFF1816G38800F |
| R713 | 321-0108-00 | | RES.,FXD,FILM:130 OHM,1%,0.125W | 91637 | MFF1816G130R0F |
| R714 | 315-0622-00 | | RES.,FXD,CMPSN:6.2K OHM,5%,0.25W | 01121 | CB6225 |
| R717 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R718 | 315-0681-00 | | RES.,FXD,CMPSN:680 OHM,5%,0.25W | 01121 | CB6815 |
| R719 | 321-0603-07 | | RES.,FXD,FILM:15K OHM,0.1%,0.125W | 91637 | MFF1816C15001B |
| R721 | 321-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.125W | 91637 | MFF1816G75R00F |
| R723 | 303-0821-00 | | RES.,FXD,CMPSN:820 OHM,5%,1W | 01121 | GB8215 |
| R729 | 315-0681-00 | | RES.,FXD,CMPSN:680 OHM,5%,0.25W | 01121 | CB6815 |
| R731 | 311-1222-00 | | RES.,VAR,NONWIR:100 OHM,20%,0.50W | 32997 | 3386F-T04-101 |
| R733 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R734 | 315-0302-00 | | RES.,FXD,CMPSN:3K OHM,5%,0.25W | 01121 | CB3025 |
| R737 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R739 | 321-0603-07 | | RES.,FXD,FILM:15K OHM,0.1%,0.125W | 91637 | MFF1816C15001B |
| R741 | 321-0193-00 | | RES.,FXD,FILM:1K OHM,1%,0.125W | 91637 | MFF1816G10000F |
| R743 | 321-0256-00 | | RES.,FXD,FILM:4.53K OHM,1%,0.125W | 91637 | MFF1816G45300F |
| R744 | 321-0251-00 | | RES.,FXD,FILM:4.02K OHM,1%,0.125W | 91637 | MFF1816G40200F |
| R745 | 321-0289-00 | | RES.,FXD,FILM:10K OHM,1%,0.125W | 91637 | MFF1816G10001F |
| R747 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R749 | 321-0775-03 | | RES.,FXD,FILM:45K OHM,0.25%,0.125W | 91637 | MFF1816D45001C |
| R751 | 311-1224-00 | | RES.,VAR,NONWIR:500 OHM,20%,0.50W | 32997 | 3386F-T04-501 |
| R752 | 321-1249-00 | | RES.,FXD,FILM:3.88K OHM,1%,0.125W | 91637 | MFF1816G38800F |
| R753 | 321-0108-00 | | RES.,FXD,FILM:130 OHM,1%,0.125W | 91637 | MFF1816G130R0F |
| R754 | 315-0622-00 | | RES.,FXD,CMPSN:6.2K OHM,5%,0.25W | 01121 | CB6225 |
| R759 | 315-0302-00 | | RES.,FXD,CMPSN:3K OHM,5%,0.25W | 01121 | CB3025 |
| R761 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R762 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R764 | 311-1227-00 | | RES.,VAR,NONWIR:5K OHM,20%,0.50W | 32997 | 3386F-T04-502 |
| R765 | 321-0294-00 | | RES.,FXD,FILM:11.3K OHM,1%,0.125W | 91637 | MFF1816G11301F |
| R767 | 321-0319-00 | | RES.,FXD,FILM:20.5K OHM,1%,0.125W | 91637 | MFF1816G20501F |
| R769 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R770 | 321-0244-00 | | RES.,FXD,FILM:3.4K OHM,1%,0.125W | 91637 | MFF1816G34000F |
| R771 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R772 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R773 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R774 | 311-1226-00 | | RES.,VAR,NONWIR:2.5K OHM,20%,0.50W | 32997 | 3386F-T04-252 |
| R775 | 321-0314-00 | | RES.,FXD,FILM:18.2K OHM,1%,0.125W | 91637 | MFF1816G18201F |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|--------------------------------------|-------------|-----------------|
| R779 | 321-0373-00 | | RES.,FXD,FILM:75K OHM,1%,0.125W | 91637 | MFF1816G75001F |
| R782 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R784 | 321-0260-00 | | RES.,FXD,FILM:4.99K OHM,1%,0.125W | 91637 | MFF1816G49900F |
| R789 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R791 | 321-0244-00 | | RES.,FXD,FILM:3.4K OHM,1%,0.125W | 91637 | MFF1816G34000F |
| R794 | 321-0327-00 | | RES.,FXD,FILM:24.9K OHM,1%,0.125W | 91637 | MFF1816G24901F |
| R795 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R798 | 321-0356-00 | | RES.,FXD,FILM:49.9K OHM,1%,0.125W | 91637 | MFF1816G49901F |
| R799 | 321-0210-00 | | RES.,FXD,FILM:1.5K OHM,1%,0.125W | 91637 | MFF1816G15000F |
| R804 | 315-0302-00 | | RES.,FXD,CMPSN:3K OHM,5%,0.25W | 01121 | CB3025 |
| R805 | 321-0304-00 | | RES.,FXD,FILM:14.3K OHM,1%,0.125W | 91637 | MFF1816G14301F |
| R808 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R815 | 315-0220-00 | | RES.,FXD,CMPSN:22 OHM,5%,0.25W | 01121 | CB2205 |
| R817 | 321-0108-00 | | RES.,FXD,FILM:130 OHM,1%,0.125W | 91637 | MFF1816G130R0F |
| R819 | 311-1224-00 | | RES.,VAR,NONWIR:500 OHM,20%,0.50W | 32997 | 3386F-T04-501 |
| R824 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R825 | 321-0251-00 | | RES.,FXD,FILM:4.02K OHM,1%,0.125W | 91637 | MFF1816G40200F |
| R826 | 315-0622-00 | | RES.,FXD,CMPSN:6.2K OHM,5%,0.25W | 01121 | CB6225 |
| R827 | 321-0256-00 | | RES.,FXD,FILM:4.53K OHM,1%,0.125W | 91637 | MFF1816G45300F |
| R828 | 321-0188-00 | | RES.,FXD,FILM:887 OHM,1%,0.125W | 91637 | MFF1816G887R0F |
| R829 | 321-0240-00 | | RES.,FXD,FILM:3.09K OHM,1%,0.125W | 91637 | MFF1816G30900F |
| R835 | 321-0289-00 | | RES.,FXD,FILM:10K OHM,1%,0.125W | 91637 | MFF1816G10001F |
| R836 | 315-0302-00 | | RES.,FXD,CMPSN:3K OHM,5%,0.25W | 01121 | CB3025 |
| R837 | 315-0470-00 | | RES.,FXD,CMPSN:47 OHM,5%,0.25W | 01121 | CB4705 |
| R839 | 311-1223-00 | | RES.,VAR,NONWIR:TRMR,250 OHM,0.5W | 02111 | 63M251T602 |
| R844 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R845 | 308-0426-00 | | RES.,FXD,WW:470 OHM,5%,3W | 91637 | CW2B-470R0J |
| R846 | 315-0221-00 | | RES.,FXD,CMPSN:220 OHM,5%,0.25W | 01121 | CB2215 |
| R852 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R855 | 321-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.125W | 91637 | MFF1816G75R00F |
| R858 | 321-0085-00 | | RES.,FXD,FILM:75 OHM,1%,0.125W | 91637 | MFF1816G75R00F |
| R860 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R861 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R862 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R865 | 321-0242-00 | | RES.,FXD,FILM:3.24K OHM,1%,0.125W | 91637 | MFF1816G32400F |
| R866 | 311-1225-00 | | RES.,VAR,NONWIR:1K OHM,20%,0.50W | 32997 | 3386F-T04-102 |
| R871 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R872 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R876 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R881 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R883 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R889 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R891 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R893 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R901 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R903 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R904 | 315-0511-00 | | RES.,FXD,CMPSN:510 OHM,5%,0.25W | 01121 | CB5115 |
| R911 | 315-0152-00 | | RES.,FXD,CMPSN:1.5K OHM,5%,0.25W | 01121 | CB1525 |
| R912 | 321-0961-07 | | RES.,FXD,FILM:500.5 OHM,0.1%,0.125W | 24546 | NE55E500R5B |
| R913 | 321-0735-07 | | RES.,FXD,FILM:1.001K OHM,0.1%,0.125W | 91637 | MFF1816C10010B |
| R915 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R916 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R917 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R918 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |

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| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|------------------------------------|-------------|-----------------|
| R919 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R923 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R926 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R927 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R928 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R941 | 315-0243-00 | | RES.,FXD,CMPSN:24K OHM,5%,0.25W | 01121 | CB2435 |
| R945 | 307-0568-00 | | RES NTWK,FXD FI:CURRENT SOURCE | 80009 | 307-0568-00 |
| R946 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R947 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R948 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R950 | 315-0752-00 | | RES.,FXD,CMPSN:7.5K OHM,5%,0.25W | 01121 | CB7525 |
| R951 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R952 | 321-0289-00 | | RES.,FXD,FILM:10K OHM,1%,0.125W | 91637 | MFF1816G10001F |
| R953 | 321-0222-00 | | RES.,FXD,FILM:2K OHM,1%,0.125W | 91637 | MFF1816G20000F |
| R955 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R957 | 321-0332-00 | | RES.,FXD,FILM:28K OHM,1%,0.125W | 91637 | MFF1816G28001F |
| R958 | 315-0682-00 | | RES.,FXD,CMPSN:6.8K OHM,5%,0.25W | 01121 | CB6825 |
| R963 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R964 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R966 | 321-0285-00 | | RES.,FXD,FILM:9.09K OHM,1%,0.125W | 91637 | MFF1816G90900F |
| R967 | 321-0268-00 | | RES.,FXD,FILM:6.04K OHM,1%,0.125W | 91637 | MFF1816G60400F |
| R970 | 321-0289-07 | | RES.,FXD,FILM:10K OHM,0.1%,0.125W | 91637 | MFF1816C10001B |
| R971 | 321-0926-07 | | RES.,FXD,FILM:4K OHM,0.1%,0.125W | 91637 | MFF1816C40000B |
| R972 | 321-0926-07 | | RES.,FXD,FILM:4K OHM,0.1%,0.125W | 91637 | MFF1816C40000B |
| R973 | 321-0222-07 | | RES.,FXD,FILM:2K OHM,0.1%,0.125W | 91637 | MFF1816C20000B |
| R977 | 315-0104-00 | | RES.,FXD,CMPSN:100K OHM,5%,0.25W | 01121 | CB1045 |
| R979 | 315-0104-00 | | RES.,FXD,CMPSN:100K OHM,5%,0.25W | 01121 | CB1045 |
| R983 | 321-0289-07 | | RES.,FXD,FILM:10K OHM,0.1%,0.125W | 91637 | MFF1816C10001B |
| R986 | 315-0362-00 | | RES.,FXD,CMPSN:3.6K OHM,5%,0.25W | 01121 | CB3625 |
| R987 | 321-0773-03 | | RES.,FXD,FILM:400 OHM,0.25%,0.125W | 91637 | MFF1816D400R0C |
| R988 | 321-0773-03 | | RES.,FXD,FILM:400 OHM,0.25%,0.125W | 91637 | MFF1816D400R0C |
| R994 | 321-0251-00 | | RES.,FXD,FILM:4.02K OHM,1%,0.125W | 91637 | MFF1816G40200F |
| R995 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R997 | 321-0126-03 | | RES.,FXD,FILM:200 OHM,0.25%,0.125W | 91637 | MFF1816D200R0C |
| R998 | 321-0126-03 | | RES.,FXD,FILM:200 OHM,0.25%,0.125W | 91637 | MFF1816D200R0C |
| R1001 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1002 | 315-0201-00 | | RES.,FXD,CMPSN:200 OHM,5%,0.25W | 01121 | CB2015 |
| R1003 | 315-0622-00 | | RES.,FXD,CMPSN:6.2K OHM,5%,0.25W | 01121 | CB6225 |
| R1004 | 321-0254-00 | | RES.,FXD,FILM:4.32K OHM,1%,0.125W | 91637 | MFF1816G43200F |
| R1010 | 315-0243-00 | | RES.,FXD,CMPSN:24K OHM,5%,0.25W | 01121 | CB2435 |
| R1014 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1015 | 315-0751-00 | | RES.,FXD,CMPSN:750 OHM,5%,0.25W | 01121 | CB7515 |
| R1016 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1021 | 321-0269-00 | | RES.,FXD,FILM:6.19K OHM,1%,0.125W | 91637 | MFF1816G61900F |
| R1022 | 321-0284-00 | | RES.,FXD,FILM:8.87K OHM,1%,0.125W | 91637 | MFF1816G88700F |
| R1023 | 321-0140-00 | | RES.,FXD,FILM:280 OHM,1%,0.125W | 91637 | MFF1816G280R0F |
| R1024 | 315-0391-00 | | RES.,FXD,CMPSN:390 OHM,5%,0.25W | 01121 | CB3915 |
| R1025 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1030 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R1032 | 321-0169-00 | | RES.,FXD,FILM:562 OHM,1%,0.125W | 91637 | MFF1816G562R0F |
| R1033 | 321-0186-00 | | RES.,FXD,FILM:845 OHM,1%,0.125W | 91637 | MFF1816G845R0F |
| R1035 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1037 | 321-0270-00 | | RES.,FXD,FILM:6.34K OHM,1%,0.125W | 91637 | MFF1816G63400F |
| R1041 | 315-0242-00 | | RES.,FXD,CMPSN:2.4K OHM,5%,0.25W | 01121 | CB2425 |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|-----------------------------------|-------------|-----------------|
| R1042 | 315-0123-00 | | RES.,FXD,CMPSN:12K OHM,5%,0.25W | 01121 | CB1235 |
| R1043 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1045 | 321-0268-00 | | RES.,FXD,FILM:6.04K OHM,1%,0.125W | 91637 | MFF1816G60400F |
| R1046 | 321-0285-00 | | RES.,FXD,FILM:9.09K OHM,1%,0.125W | 91637 | MFF1816G90900F |
| R1047 | 321-0364-00 | | RES.,FXD,FILM:60.4K OHM,1%,0.125W | 91637 | MFF1816G60401F |
| R1052 | 315-0203-00 | | RES.,FXD,CMPSN:20K OHM,5%,0.25W | 01121 | CB2035 |
| R1053 | 315-0104-00 | | RES.,FXD,CMPSN:100K OHM,5%,0.25W | 01121 | CB1045 |
| R1056 | 315-0134-00 | | RES.,FXD,CMPSN:130K OHM,5%,0.25W | 01121 | CB1345 |
| R1057 | 321-0364-00 | | RES.,FXD,FILM:60.4K OHM,1%,0.125W | 91637 | MFF1816G60401F |
| R1070 | 321-0231-00 | | RES.,FXD,FILM:2.49K OHM,1%,0.125W | 91637 | MFF1816G24900F |
| R1071 | 315-0512-00 | | RES.,FXD,CMPSN:5.1K OHM,5%,0.25W | 01121 | CB5125 |
| R1072 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R1077 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R1079 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R1080 | 321-0260-00 | | RES.,FXD,FILM:4.99K OHM,1%,0.125W | 91637 | MFF1816G49900F |
| R1082 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R1085 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1088 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R1089 | 315-0680-00 | | RES.,FXD,CMPSN:68 OHM,5%,0.25W | 01121 | CB6805 |
| R1090 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1092 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R1101 | 321-0154-00 | | RES.,FXD,FILM:392 OHM,1%,0.125W | 91637 | MFF1816G392R0F |
| R1102 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R1108 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1111 | 321-0239-00 | | RES.,FXD,FILM:3.01K OHM,1%,0.125W | 91637 | MFF1816G30100F |
| R1112 | 315-0303-00 | | RES.,FXD,CMPSN:30K OHM,5%,0.25W | 01121 | CB3035 |
| R1121 | 315-0911-00 | | RES.,FXD,CMPSN:910 OHM,5%,0.25W | 01121 | CB9115 |
| R1122 | 315-0562-00 | | RES.,FXD,CMPSN:5.6K OHM,5%,0.25W | 01121 | CB5625 |
| R1123 | 315-0202-00 | | RES.,FXD,CMPSN:2K OHM,5%,0.25W | 01121 | CB2025 |
| R1124 | 315-0302-00 | | RES.,FXD,CMPSN:3K OHM,5%,0.25W | 01121 | CB3025 |
| R1126 | 321-0175-00 | | RES.,FXD,FILM:649 OHM,1%,0.125W | 91637 | MFF1816G649R0F |
| R1127 | 321-0196-00 | | RES.,FXD,FILM:1.07K OHM,1%,0.125W | 91637 | MFF1816G10700F |
| R1128 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R1129 | 315-0511-00 | | RES.,FXD,CMPSN:510 OHM,5%,0.25W | 01121 | CB5115 |
| R1131 | 315-0911-00 | | RES.,FXD,CMPSN:910 OHM,5%,0.25W | 01121 | CB9115 |
| R1132 | 315-0303-00 | | RES.,FXD,CMPSN:30K OHM,5%,0.25W | 01121 | CB3035 |
| R1134 | 321-0362-00 | | RES.,FXD,FILM:57.6K OHM,1%,0.125W | 91637 | MFF1816G57601F |
| R1135 | 321-0382-00 | | RES.,FXD,FILM:93.1K OHM,1%,0.125W | 91637 | MFF1816G93101F |
| R1136 | 321-0145-00 | | RES.,FXD,FILM:316 OHM,1%,0.125W | 91637 | MFF1816G316R0F |
| R1138 | 321-0193-00 | | RES.,FXD,FILM:1K OHM,1%,0.125W | 91637 | MFF1816G10000F |
| R1139 | 321-0184-00 | | RES.,FXD,FILM:806 OHM,1%,0.125W | 91637 | MFF1816G806R0F |
| R1140 | 321-0274-00 | | RES.,FXD,FILM:6.98K OHM,1%,0.125W | 91637 | MFF1816G69800F |
| R1142 | 315-0303-00 | | RES.,FXD,CMPSN:30K OHM,5%,0.25W | 01121 | CB3035 |
| R1145 | 315-0510-00 | | RES.,FXD,CMPSN:51 OHM,5%,0.25W | 01121 | CB5105 |
| R1146 | 321-0145-00 | | RES.,FXD,FILM:316 OHM,1%,0.125W | 91637 | MFF1816G316R0F |
| R1148 | 321-0193-00 | | RES.,FXD,FILM:1K OHM,1%,0.125W | 91637 | MFF1816G10000F |
| R1149 | 321-0184-00 | | RES.,FXD,FILM:806 OHM,1%,0.125W | 91637 | MFF1816G806R0F |
| R1151 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1152 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1155 | 315-0911-00 | | RES.,FXD,CMPSN:910 OHM,5%,0.25W | 01121 | CB9115 |
| R1156 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1157 | 321-0164-00 | | RES.,FXD,FILM:499 OHM,1%,0.125W | 91637 | MFF1816G499R0F |
| R1158 | 321-0251-00 | | RES.,FXD,FILM:4.02K OHM,1%,0.125W | 91637 | MFF1816G40200F |
| R1162 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |

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| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|-----------------------------------|-------------|-----------------|
| R1165 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1166 | 321-0260-00 | | RES.,FXD,FILM:4.99K OHM,1%,0.125W | 91637 | MFF1816G49900F |
| R1167 | 321-0164-00 | | RES.,FXD,FILM:499 OHM,1%,0.125W | 91637 | MFF1816G499R0F |
| R1168 | 321-0168-00 | | RES.,FXD,FILM:549 OHM,1%,0.125W | 91637 | MFF1816G549R0F |
| R1169 | 321-0168-00 | | RES.,FXD,FILM:549 OHM,1%,0.125W | 91637 | MFF1816G549R0F |
| R1172 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1174 | 321-0284-00 | | RES.,FXD,FILM:8.87K OHM,1%,0.125W | 91637 | MFF1816G88700F |
| R1175 | 321-0243-00 | | RES.,FXD,FILM:3.32K OHM,1%,0.125W | 91637 | MFF1816G33200F |
| R1177 | 321-0251-00 | | RES.,FXD,FILM:4.02K OHM,1%,0.125W | 91637 | MFF1816G40200F |
| R1178 | 321-0236-00 | | RES.,FXD,FILM:2.8K OHM,1%,0.125W | 91637 | MFF1816G28000F |
| R1179 | 321-0236-00 | | RES.,FXD,FILM:2.8K OHM,1%,0.125W | 91637 | MFF1816G28000F |
| R1182 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1195 | 311-1224-00 | | RES.,VAR,NONWIR:500 OHM,20%,0.50W | 32997 | 3386F-T04-501 |
| R1198 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1203 | 321-0224-00 | | RES.,FXD,FILM:2.1K OHM,1%,0.125W | 91637 | MFF1816G21000F |
| R1204 | 321-0239-00 | | RES.,FXD,FILM:3.01K OHM,1%,0.125W | 91637 | MFF1816G30100F |
| R1205 | 321-0181-00 | | RES.,FXD,FILM:750 OHM,1%,0.125W | 91637 | MFF1816G750R0F |
| R1206 | 321-0306-00 | | RES.,FXD,FILM:15K OHM,1%,0.125W | 91637 | MFF1816G15001F |
| R1207 | 315-0512-00 | | RES.,FXD,CMPSN:5.1K OHM,5%,0.25W | 01121 | CB5125 |
| R1208 | 321-0291-00 | | RES.,FXD,FILM:10.5K OHM,1%,0.125W | 91637 | MFF1816G10501F |
| R1209 | 321-0181-00 | | RES.,FXD,FILM:750 OHM,1%,0.125W | 91637 | MFF1816G750R0F |
| R1212 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1215 | 321-0240-00 | | RES.,FXD,FILM:3.09K OHM,1%,0.125W | 91637 | MFF1816G30900F |
| R1216 | 321-0244-00 | | RES.,FXD,FILM:3.4K OHM,1%,0.125W | 91637 | MFF1816G34000F |
| R1217 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1218 | 321-0240-00 | | RES.,FXD,FILM:3.09K OHM,1%,0.125W | 91637 | MFF1816G30900F |
| R1221 | 321-0139-00 | | RES.,FXD,FILM:274 OHM,1%,0.125W | 91637 | MFF1816G274R0F |
| R1224 | 321-0257-00 | | RES.,FXD,FILM:4.64K OHM,1%,0.125W | 91637 | MFF1816G46400F |
| R1225 | 321-0163-00 | | RES.,FXD,FILM:487 OHM,1%,0.125W | 91637 | MFF1816G487R0F |
| R1228 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1229 | 315-0302-00 | | RES.,FXD,CMPSN:3K OHM,5%,0.25W | 01121 | CB3025 |
| R1231 | 321-0178-00 | | RES.,FXD,FILM:698 OHM,1%,0.125W | 91637 | MFF1816G698R0F |
| R1235 | 321-0327-00 | | RES.,FXD,FILM:24.9K OHM,1%,0.125W | 91637 | MFF1816G24901F |
| R1236 | 321-0245-00 | | RES.,FXD,FILM:3.48K OHM,1%,0.125W | 91637 | MFF1816G34800F |
| R1237 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1238 | 321-0191-00 | | RES.,FXD,FILM:953 OHM,1%,0.125W | 91637 | MFF1816G953R0F |
| R1242 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1243 | 321-0328-00 | | RES.,FXD,FILM:25.5K OHM,1%,0.125W | 91637 | MFF1816G25501F |
| R1245 | 321-0356-00 | | RES.,FXD,FILM:49.9K OHM,1%,0.125W | 91637 | MFF1816G49901F |
| R1246 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1247 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1248 | 321-0222-00 | | RES.,FXD,FILM:2K OHM,1%,0.125W | 91637 | MFF1816G20000F |
| R1254 | 315-0512-00 | | RES.,FXD,CMPSN:5.1K OHM,5%,0.25W | 01121 | CB5125 |
| R1255 | 315-0242-00 | | RES.,FXD,CMPSN:2.4K OHM,5%,0.25W | 01121 | CB2425 |
| R1256 | 321-0219-00 | | RES.,FXD,FILM:1.87K OHM,1%,0.125W | 91637 | MFF1816G18700F |
| R1257 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R1258 | 311-1222-00 | | RES.,VAR,NONWIR:100 OHM,20%,0.50W | 32997 | 3386F-T04-101 |
| R1259 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1260 | 315-0121-00 | | RES.,FXD,CMPSN:120 OHM,5%,0.25W | 01121 | CB1215 |
| R1261 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1264 | 321-0306-00 | | RES.,FXD,FILM:15K OHM,1%,0.125W | 91637 | MFF1816G15001F |
| R1267 | 321-0603-07 | | RES.,FXD,FILM:15K OHM,0.1%,0.125W | 91637 | MFF1816C15001B |
| R1269 | 321-0232-00 | | RES.,FXD,FILM:2.55K OHM,1%,0.125W | 91637 | MFF1816G25500F |
| R1270 | 311-1254-00 | | RES.,VAR,NONWIR:1M OHM,20%,0.50W | 73138 | 72-18-0 |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|--------------------------------------|-------------|-----------------|
| R1272 | 315-0303-00 | | RES.,FXD,CMPSN:30K OHM,5%,0.25W | 01121 | CB3035 |
| R1273 | 315-0104-00 | | RES.,FXD,CMPSN:100K OHM,5%,0.25W | 01121 | CB1045 |
| R1274 | 321-0356-00 | | RES.,FXD,FILM:49.9K OHM,1%,0.125W | 91637 | MFF1816G49901F |
| R1275 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1276 | 315-0271-00 | | RES.,FXD,CMPSN:270 OHM,5%,0.25W | 01121 | CB2715 |
| R1277 | 321-0193-00 | | RES.,FXD,FILM:1K OHM,1%,0.125W | 91637 | MFF1816G10000F |
| R1278 | 321-0685-07 | | RES.,FXD,FILM:30K OHM,0.1%,0.125W | 91637 | MFF1816G30001B |
| R1282 | 321-0275-00 | | RES.,FXD,FILM:7.15K OHM,1%,0.125W | 91637 | MFF1816G71500F |
| R1284 | 311-1252-00 | | RES.,VAR,NONWIR:500K OHM,20%,0.50W | 32997 | 3386F-T04-504 |
| R1285 | 315-0472-00 | | RES.,FXD,CMPSN:4.7K OHM,5%,0.25W | 01121 | CB4725 |
| R1288 | 321-0222-00 | | RES.,FXD,FILM:2K OHM,1%,0.125W | 91637 | MFF1816G20000F |
| R1289 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1293 | 321-0260-00 | | RES.,FXD,FILM:4.99K OHM,1%,0.125W | 91637 | MFF1816G49900F |
| R1294 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1295 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1296 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1298 | 321-0175-00 | | RES.,FXD,FILM:649 OHM,1%,0.125W | 91637 | MFF1816G649R0F |
| R1299 | 321-0173-00 | | RES.,FXD,FILM:619 OHM,1%,0.125W | 91637 | MFF1816G619R0F |
| R1302 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1303 | 321-0260-00 | | RES.,FXD,FILM:4.99K OHM,1%,0.125W | 91637 | MFF1816G49900F |
| R1304 | 315-0512-00 | | RES.,FXD,CMPSN:5.1K OHM,5%,0.25W | 01121 | CB5125 |
| R1305 | 321-1686-07 | | RES.,FXD,FILM:10.97K OHM,0.1%,0.125W | 91637 | MFF1816C10971B |
| R1309 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1312 | 321-0155-00 | | RES.,FXD,FILM:402 OHM,1%,0.125W | 91637 | MFF1816G402R0F |
| R1318 | 321-0155-00 | | RES.,FXD,FILM:402 OHM,1%,0.125W | 91637 | MFF1816G402R0F |
| R1319 | 321-0088-00 | | RES.,FXD,FILM:80.6 OHM,1%,0.125W | 91637 | MFF1816G80R60F |
| R1324 | 321-0190-00 | | RES.,FXD,FILM:931 OHM,1%,0.125W | 91637 | MFF1816G931R0F |
| R1329 | 321-0164-00 | | RES.,FXD,FILM:499 OHM,1%,0.125W | 91637 | MFF1816G499R0F |
| R1332 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1333 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1334 | 321-0277-00 | | RES.,FXD,FILM:7.5K OHM,1%,0.125W | 91637 | MFF1816G75000F |
| R1342 | 315-0510-00 | | RES.,FXD,CMPSN:51 OHM,5%,0.25W | 01121 | CB5105 |
| R1344 | 321-0193-00 | | RES.,FXD,FILM:1K OHM,1%,0.125W | 91637 | MFF1816G10000F |
| R1351 | 311-1224-00 | | RES.,VAR,NONWIR:500 OHM,20%,0.50W | 32997 | 3386F-T04-501 |
| R1353 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1360 | 315-0751-00 | | RES.,FXD,CMPSN:750 OHM,5%,0.25W | 01121 | CB7515 |
| R1361 | 315-0132-00 | | RES.,FXD,CMPSN:1.3K OHM,5%,0.25W | 01121 | CB1325 |
| R1362 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R1363 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R1364 | 311-1225-00 | | RES.,VAR,NONWIR:1K OHM,20%,0.50W | 32997 | 3386F-T04-102 |
| R1367 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1371 | 315-0511-00 | | RES.,FXD,CMPSN:510 OHM,5%,0.25W | 01121 | CB5115 |
| R1373 | 321-0246-00 | | RES.,FXD,FILM:3.57K OHM,1%,0.125W | 91637 | MFF1816G35700F |
| R1376 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1377 | 321-0385-00 | | RES.,FXD,FILM:100K OHM,1%,0.125W | 91637 | MFF1816G10002F |
| R1380 | 321-0299-00 | | RES.,FXD,FILM:12.7K OHM,1%,0.125W | 91637 | MFF1816G12701F |
| R1381 | 315-0511-00 | | RES.,FXD,CMPSN:510 OHM,5%,0.25W | 01121 | CB5115 |
| R1382 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1383 | 321-0164-00 | | RES.,FXD,FILM:499 OHM,1%,0.125W | 91637 | MFF1816G499R0F |
| R1385 | 321-0295-00 | | RES.,FXD,FILM:11.5K OHM,1%,0.125W | 91637 | MFF1816G11501F |
| R1388 | 321-0228-00 | | RES.,FXD,FILM:2.32K OHM,1%,0.125W | 91637 | MFF1816G23200F |
| R1390 | 321-0260-00 | | RES.,FXD,FILM:4.99K OHM,1%,0.125W | 91637 | MFF1816G49900F |
| R1391 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1392 | 321-0165-00 | | RES.,FXD,FILM:511 OHM,1%,0.125W | 91637 | MFF1816G511R0F |

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| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|-----------------------------------|-------------|-----------------|
| R1393 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1395 | 321-0244-00 | | RES.,FXD,FILM:3.4K OHM,1%,0.125W | 91637 | MFF1816G34000F |
| R1397 | 321-0186-00 | | RES.,FXD,FILM:845 OHM,1%,0.125W | 91637 | MFF1816G845R0F |
| R1398 | 321-0205-00 | | RES.,FXD,FILM:1.33K OHM,1%,0.125W | 91637 | MFF1816G13300F |
| R1400 | 321-0226-00 | | RES.,FXD,FILM:2.21K OHM,1%,0.125W | 91637 | MFF1816G22100F |
| R1401 | 321-0231-00 | | RES.,FXD,FILM:2.49K OHM,1%,0.125W | 91637 | MFF1816G24900F |
| R1402 | 321-0311-00 | | RES.,FXD,FILM:16.9K OHM,1%,0.125W | 91637 | MFF1816G16901F |
| R1403 | 321-0272-00 | | RES.,FXD,FILM:6.65K OHM,1%,0.125W | 91637 | MFF1816G66500F |
| R1405 | 321-0385-00 | | RES.,FXD,FILM:100K OHM,1%,0.125W | 91637 | MFF1816G10002F |
| R1406 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1407 | 321-0186-00 | | RES.,FXD,FILM:845 OHM,1%,0.125W | 91637 | MFF1816G845R0F |
| R1408 | 321-0205-00 | | RES.,FXD,FILM:1.33K OHM,1%,0.125W | 91637 | MFF1816G13300F |
| R1411 | 321-0260-00 | | RES.,FXD,FILM:4.99K OHM,1%,0.125W | 91637 | MFF1816G49900F |
| R1413 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1415 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1416 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1417 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1418 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1421 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1424 | 315-0222-00 | | RES.,FXD,CMPSN:2.2K OHM,5%,0.25W | 01121 | CB2225 |
| R1425 | 311-1228-00 | | RES.,VAR,NONWIR:10K OHM,20%,0.50W | 32997 | 3386F-T04-103 |
| R1426 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1427 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1431 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1432 | 321-0205-00 | | RES.,FXD,FILM:1.33K OHM,1%,0.125W | 91637 | MFF1816G13300F |
| R1435 | 315-0243-00 | | RES.,FXD,CMPSN:24K OHM,5%,0.25W | 01121 | CB2435 |
| R1436 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1437 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1438 | 321-0193-00 | | RES.,FXD,FILM:1K OHM,1%,0.125W | 91637 | MFF1816G10000F |
| R1441 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1442 | 321-0225-00 | | RES.,FXD,FILM:2.15K OHM,1%,0.125W | 91637 | MFF1816G21500F |
| R1445 | 315-0203-00 | | RES.,FXD,CMPSN:20K OHM,5%,0.25W | 01121 | CB2035 |
| R1446 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1447 | 321-0205-00 | | RES.,FXD,FILM:1.33K OHM,1%,0.125W | 91637 | MFF1816G13300F |
| R1448 | 321-0135-00 | | RES.,FXD,FILM:249 OHM,1%,0.125W | 91637 | MFF1816G249R0F |
| R1449 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1452 | 321-0210-00 | | RES.,FXD,FILM:1.5K OHM,1%,0.125W | 91637 | MFF1816G15000F |
| R1456 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1457 | 321-0172-00 | | RES.,FXD,FILM:604 OHM,1%,0.125W | 91637 | MFF1816G604R0F |
| R1458 | 315-0202-00 | | RES.,FXD,CMPSN:2K OHM,5%,0.25W | 01121 | CB2025 |
| R1459 | 321-0138-00 | | RES.,FXD,FILM:267 OHM,1%,0.125W | 91637 | MFF1816G267R0F |
| R1463 | 321-0201-00 | | RES.,FXD,FILM:1.21K OHM,1%,0.125W | 91637 | MFF1816G12100F |
| R1480 | 315-0103-00 | | RES.,FXD,CMPSN:10K OHM,5%,0.25W | 01121 | CB1035 |
| R1481 | 315-0102-00 | | RES.,FXD,CMPSN:1K OHM,5%,0.25W | 01121 | CB1025 |
| R1491 | 321-0283-00 | | RES.,FXD,FILM:8.66K OHM,1%,0.125W | 91637 | MFF1816G86600F |
| R1502 | 315-0101-00 | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1506 | 321-0169-00 | | RES.,FXD,FILM:562 OHM,1%,0.125W | 91637 | MFF1816G562R0F |
| R1507 | 321-0237-00 | | RES.,FXD,FILM:2.87K OHM,1%,0.125W | 91637 | MFF1816G28700F |
| R1508 | 315-0100-00 | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1511 | 321-0289-00 | | RES.,FXD,FILM:10K OHM,1%,0.125W | 91637 | MFF1816G10001F |
| R1515 | 321-0233-00 | | RES.,FXD,FILM:2.61K OHM,1%,0.125W | 91637 | MFF1816G26100F |
| R1521 | 321-0986-07 | | RES.,FXD,FILM:25K OHM,0.1%,0.125W | 91637 | MFF1816C25001B |
| R1527 | 308-0426-00 | | RES.,FXD,WW:470 OHM,5%,3W | 91637 | CW2B-470R0J |
| R1535 | 321-0172-00 | | RES.,FXD,FILM:604 OHM,1%,0.125W | 91637 | MFF1816G604R0F |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Discont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|-------------------------|---------|--|-------------|-----------------|
| R1537 | 321-0085-00 | | | RES.,FXD,FILM:75 OHM,1%,0.125W | 91637 | MFF1816G75R00F |
| R1538 | 321-0085-00 | | | RES.,FXD,FILM:75 OHM,1%,0.125W | 91637 | MFF1816G75R00F |
| R1539 | 315-0100-00 | | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1543 | 321-0289-00 | | | RES.,FXD,FILM:10K OHM,1%,0.125W | 91637 | MFF1816G10001F |
| R1547 | 321-0193-00 | | | RES.,FXD,FILM:1K OHM,1%,0.125W | 91637 | MFF1816G10000F |
| R1551 | 321-0322-00 | | | RES.,FXD,FILM:22.1K OHM,1%,0.125W | 91637 | MFF1816G22101F |
| R1552 | 315-0912-00 | | | RES.,FXD,CMPSN:9.1K OHM,5%,0.25W | 01121 | CB9125 |
| R1553 | 321-0222-00 | | | RES.,FXD,FILM:2K OHM,1%,0.125W | 91637 | MFF1816G20000F |
| R1554 | 311-1223-00 | | | RES.,VAR,NONWIR:TRMR,250 OHM,0.5W | 02111 | 63M251T602 |
| R1555 | 321-0232-00 | | | RES.,FXD,FILM:2.55K OHM,1%,0.125W | 91637 | MFF1816G25500F |
| R1556 | 311-1221-00 | | | RES.,VAR,NONWIR:50 OHM,20%,0.50W | 32997 | 3386F-T04-500 |
| R1557 | 315-0681-00 | | | RES.,FXD,CMPSN:680 OHM,5%,0.25W | 01121 | CB6815 |
| R1558 | 321-0256-00 | | | RES.,FXD,FILM:4.53K OHM,1%,0.125W | 91637 | MFF1816G45300F |
| R1559 | 315-0302-00 | | | RES.,FXD,CMPSN:3K OHM,5%,0.25W | 01121 | CB3025 |
| R1561 | 315-0243-00 | | | RES.,FXD,CMPSN:24K OHM,5%,0.25W | 01121 | CB2435 |
| R1565 | 321-0151-00 | | | RES.,FXD,FILM:365 OHM,1%,0.125W | 91637 | MFF1816G365R0F |
| R1566 | 321-0277-00 | | | RES.,FXD,FILM:7.5K OHM,1%,0.125W | 91637 | MFF1816G75000F |
| R1567 | 321-0277-00 | | | RES.,FXD,FILM:7.5K OHM,1%,0.125W | 91637 | MFF1816G75000F |
| R1568 | 321-0251-00 | | | RES.,FXD,FILM:4.02K OHM,1%,0.125W | 91637 | MFF1816G40200F |
| R1569 | 315-0100-00 | | | RES.,FXD,CMPSN:10 OHM,5%,0.25W | 01121 | CB1005 |
| R1571 | 315-0101-00 | | | RES.,FXD,CMPSN:100 OHM,5%,0.25W | 01121 | CB1015 |
| R1577 | 321-0289-00 | | | RES.,FXD,FILM:10K OHM,1%,0.125W | 91637 | MFF1816G10001F |
| R1578 | 315-0622-00 | | | RES.,FXD,CMPSN:6.2K OHM,5%,0.25W | 01121 | CB6225 |
| RT128 | 307-0472-00 | | | RES.,THERMAL:100K OHM,5% DISC | 15801 | JP51J5 |
| S80 | 260-0731-00 | | | SWITCH,LEVER:1 SECT,2 POSN,30 DEG | 80009 | 260-0731-00 |
| S81 | 260-0615-00 | | | SWITCH,ROTARY: | 80009 | 260-0615-00 |
| S82 | 260-0731-00 | | | SWITCH,LEVER:1 SECT,2 POSN,30 DEG | 80009 | 260-0731-00 |
| S83 | 260-0621-00 | | | SWITCH,LEVER:1 SECT,3 POSN,30 DEG | 80009 | 260-0621-00 |
| S84 | 260-0731-00 | | | SWITCH,LEVER:1 SECT,2 POSN,30 DEG | 80009 | 260-0731-00 |
| S85 | 260-0731-00 | | | SWITCH,LEVER:1 SECT,2 POSN,30 DEG | 80009 | 260-0731-00 |
| S86 | 260-0731-00 | | | SWITCH,LEVER:1 SECT,2 POSN,30 DEG | 80009 | 260-0731-00 |
| S87 | 260-0621-00 | | | SWITCH,LEVER:1 SECT,3 POSN,30 DEG | 80009 | 260-0621-00 |
| S88 | 260-0731-00 | | | SWITCH,LEVER:1 SECT,2 POSN,30 DEG | 80009 | 260-0731-00 |
| S89 | 260-0731-00 | | | SWITCH,LEVER:1 SECT,2 POSN,30 DEG | 80009 | 260-0731-00 |
| S90 | 260-0621-00 | | | SWITCH,LEVER:1 SECT,3 POSN,30 DEG | 80009 | 260-0621-00 |
| S91 | 260-0731-00 | | | SWITCH,LEVER:1 SECT,2 POSN,30 DEG | 80009 | 260-0731-00 |
| S92 | 260-0731-00 | | | SWITCH,LEVER:1 SECT,2 POSN,30 DEG | 80009 | 260-0731-00 |
| S93A,B | 260-1389-00 | | | SWITCH,LEVER:1 SECT,3 POSN,30 DEG | 80009 | 260-1389-00 |
| S94 | 260-0621-00 | | | SWITCH,LEVER:1 SECT,3 POSN,30 DEG | 80009 | 260-0621-00 |
| S95 | 260-0621-00 | | | SWITCH,LEVER:1 SECT,3 POSN,30 DEG | 80009 | 260-0621-00 |
| S96 | 260-0731-00 | | | SWITCH,LEVER:1 SECT,2 POSN,30 DEG | 80009 | 260-0731-00 |
| S97 | 260-0731-00 | | | SWITCH,LEVER:1 SECT,2 POSN,30 DEG | 80009 | 260-0731-00 |
| S98 | 260-1902-00 | | | SWITCH,ROCKER:DPST,16A,250VAC | 04009 | 260011E |
| T98 | 120-1123-00 | | | XFMR,PWR,STPDN: | 80009 | 120-1123-00 |
| U112 | 156-0158-05 | B010100 | B010346 | MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER | 80009 | 156-0158-05 |
| U112 | 156-0158-04 | B010347 | | MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER | 01295 | N99320JG |
| U152 | 156-0733-00 | | | MICROCIRCUIT,DI:DUAL MONOSTABLE MV | 80009 | 156-0733-00 |
| U153 | 156-0784-00 | B010100 | B020428 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 01295 | SN74LS163AN |
| U153 | 156-0784-02 | B020429 | | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 27014 | DM74LS163ANA + |
| U154 | 156-0388-00 | | | MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP | 80009 | 156-0388-00 |

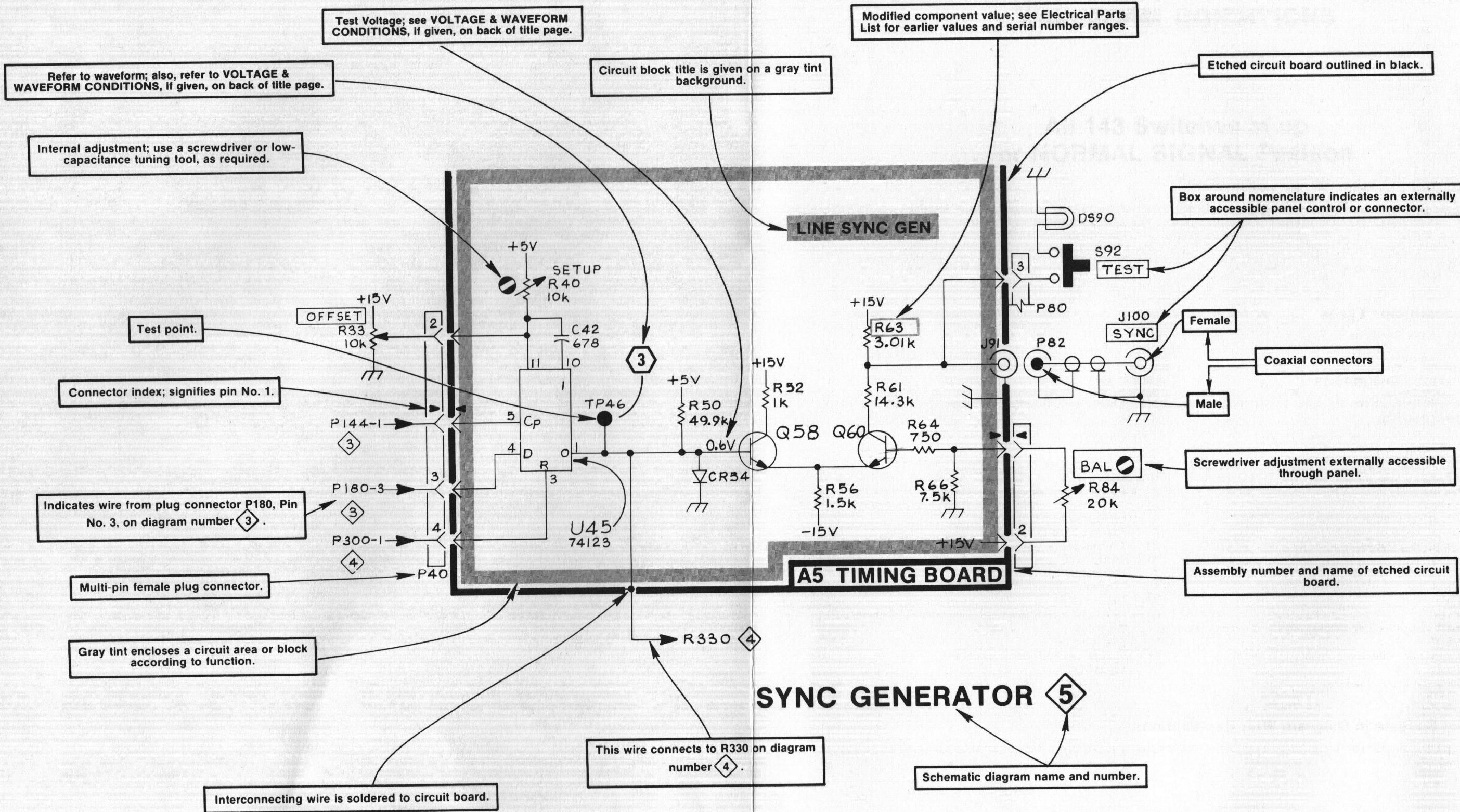
Replaceable Electrical Parts—143

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|---|-------------|------------------|
| U171 | 156-0381-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT EXCL OR GATES | 80009 | 156-0381-00 |
| U172 | 156-0784-00 | B010100 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 01295 | SN74LS163AN |
| U172 | 156-0784-02 | B020429 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 27014 | DM74LS163ANA + |
| U174 | 156-0385-00 | | MICROCIRCUIT,DI:HEX.INVERTER | 80009 | 156-0385-00 |
| U175 | 156-0388-00 | | MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP | 80009 | 156-0388-00 |
| U199 | 156-0158-05 | B010100 | MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER | 80009 | 156-0158-05 |
| U199 | 156-0158-04 | B010347 | MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER | 01295 | N99320JG |
| U201 | 156-0388-00 | | MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP | 80009 | 156-0388-00 |
| U202 | 156-0382-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE | 01295 | SN74LS00(N OR J) |
| U204 | 156-0784-00 | B010100 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 01295 | SN74LS163AN |
| U204 | 156-0784-02 | B020429 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 27014 | DM74LS163ANA + |
| U205 | 156-0784-00 | B010100 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 01295 | SN74LS163AN |
| U205 | 156-0784-02 | B020429 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 27014 | DM74LS163ANA + |
| U235 | 156-0905-02 | B010100 | MICROCIRCUIT,DI:PROM,PROGRAMMED | 80009 | 156-0905-02 |
| U235 | 160-0230-00 | B020000 | MICROCIRCUIT,DI:256 X 4 FUSE PRGM | 80009 | 160-0230-00 |
| U241 | 156-0383-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NOR GATE | 80009 | 156-0383-00 |
| U243 | 156-0504-00 | | MICROCIRCUIT,DI:HEX BUFFER | 27014 | MM5610AJ |
| U247 | 156-0504-00 | | MICROCIRCUIT,DI:HEX BUFFER | 27014 | MM5610AJ |
| U248 | 156-0392-00 | | MICROCIRCUIT,DI:QUAD LATCH W/CLEAR | 34335 | SN74LS175N OR J |
| U255 | 155-0147-00 | B010100 | MICROCIRCUIT,DI:CIRCUIT TV GEN MOS,40 LEAD | 80009 | 155-0147-00 |
| U255 | 155-0147-02 | B010148 | MICROCIRCUIT,DI:CIRCUIT TV GEN,MOS,40 LEAD | 80009 | 155-0147-02 |
| U255 | 155-0188-00 | B020000 | MICROCIRCUIT,DI:SYNC GENERATOR | 80009 | 155-0188-00 |
| U261 | 156-0382-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE | 01295 | SN74LS00(N OR J) |
| U263 | 156-0503-00 | | MICROCIRCUIT,DI:HEX INVERTER BUFFER | 02735 | CD4009UBF |
| U280 | 156-0388-00 | | MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP | 80009 | 156-0388-00 |
| U281 | 156-0422-00 | | MICROCIRCUIT,DI:UP/DOWN SYNC BINARY COUNTER | 07263 | 74LS191PC OR DC |
| U283 | 156-0385-00 | | MICROCIRCUIT,DI:HEX.INVERTER | 80009 | 156-0385-00 |
| U286 | 156-0041-00 | | MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP | 27014 | DM7474N |
| U300 | 156-0487-00 | | MICROCIRCUIT,DI:DUAL RETRIG,ONE SHOT | 80009 | 156-0487-00 |
| U301 | 156-0651-00 | | MICROCIRCUIT,DI:8-BIT PRL-OUT,SER SHF RGTR | 01295 | SN74LS164N |
| U303 | 156-0487-00 | | MICROCIRCUIT,DI:DUAL RETRIG,ONE SHOT | 80009 | 156-0487-00 |
| U306 | 156-0784-00 | B010100 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 01295 | SN74LS163AN |
| U306 | 156-0784-02 | B020429 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 27014 | DM74LS163ANA + |
| U318 | 156-0158-05 | B010100 | MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER | 80009 | 156-0158-05 |
| U318 | 156-0158-04 | B010347 | MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER | 01295 | N99320JG |
| U363 | 156-0388-00 | | MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP | 80009 | 156-0388-00 |
| U365 | 156-0844-00 | | MICROCIRCUIT,DI:SYNC 4-BIT BIN COUNTER | 34335 | SN74LS161N |
| U366 | 156-0382-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE | 01295 | SN74LS00(N OR J) |
| U368 | 156-0733-00 | | MICROCIRCUIT,DI:DUAL MONOSTABLE MV | 80009 | 156-0733-00 |
| U385 | 156-0381-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT EXCL OR GATES | 80009 | 156-0381-00 |
| U386 | 156-0388-00 | | MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP | 80009 | 156-0388-00 |
| U391 | 156-0412-00 | | MICROCIRCUIT,DI:4-BIT BIN UP/DOWN COUNTER | 01295 | SN74LS193N |
| U393 | 156-0067-11 | B010100 | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 02735 | CA741CE |
| U393 | 156-0700-01 | B010347 | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 02735 | CA741S |
| U406 | 156-0386-00 | | MICROCIRCUIT,DI:TRIPLE 3-INPUT NAND GATE | 04713 | SN74LS10N OR J |
| U408 | 156-0382-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE | 01295 | SN74LS00(N OR J) |
| U411 | 156-0382-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE | 01295 | SN74LS00(N OR J) |
| U412 | 156-0686-00 | | MICROCIRCUIT,LI:OPNL AMPL,HIGH IMPEDANCE | 02735 | CA3130S |
| U415 | 156-0383-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NOR GATE | 80009 | 156-0383-00 |
| U418 | 156-0013-00 | | MICROCIRCUIT,DI:DIFF COMPARATOR | 07263 | SL21770 |
| U429 | 156-0013-00 | | MICROCIRCUIT,DI:DIFF COMPARATOR | 07263 | SL21770 |
| U439 | 156-0686-00 | | MICROCIRCUIT,LI:OPNL AMPL,HIGH IMPEDANCE | 02735 | CA3130S |
| U441 | 156-0487-00 | | MICROCIRCUIT,DI:DUAL RETRIG,ONE SHOT | 80009 | 156-0487-00 |
| U443 | 156-0480-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT AND GATE | 01295 | SN74LS08(N OR J) |

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|--------------------------------|---|-------------|------------------|
| U445 | 156-0733-00 | | MICROCIRCUIT,DI:DUAL MONOSTABLE MV | 80009 | 156-0733-00 |
| U471 | 156-0686-00 | | MICROCIRCUIT,LI:OPNL AMPL,HIGH IMPEDANCE | 02735 | CA3130S |
| U473 | 156-0385-00 | | MICROCIRCUIT,DI:HEX.INVERTER | 80009 | 156-0385-00 |
| U475 | 156-0382-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE | 01295 | SN74LS00(N OR J) |
| U477 | 156-0386-00 | | MICROCIRCUIT,DI:TRIPLE 3-INPUT NAND GATE | 04713 | SN74LS10N OR J |
| U521 | 156-0130-00 | B010100 B020428 | MICROCIRCUIT,LI:MODULATOR/DEMODULATOR | 80009 | 156-0130-00 |
| U521 | 156-0130-02 | B020429 | MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN | 04713 | SC77162GH |
| U529 | 155-0144-00 | | MICROCIRCUIT,LI:DUAL IN-LINE,16 LEAD | 80009 | 155-0144-00 |
| U535 | 156-0906-00 | | MICROCIRCUIT,LI:IF AMPL & QUADRATURE DET | 80009 | 156-0906-00 |
| U563 | 156-0930-00 | | MICROCIRCUIT,LI:NEGATIVE VOLTAGE REGULATOR | 04713 | SC75012P |
| U574 | 155-0145-00 | | MICROCIRCUIT,LI:DUAL IN-LINE,16 LEAD | 80009 | 155-0145-00 |
| U594 | 155-0145-00 | | MICROCIRCUIT,LI:DUAL IN-LINE,16 LEAD | 80009 | 155-0145-00 |
| U604 | 156-0067-11 | B010100 B010346 | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 02735 | CA741CE |
| U604 | 156-0700-01 | B010347 | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 02735 | CA741S |
| U614 | 155-0145-00 | | MICROCIRCUIT,LI:DUAL IN-LINE,16 LEAD | 80009 | 155-0145-00 |
| U623 | 156-0930-00 | | MICROCIRCUIT,LI:NEGATIVE VOLTAGE REGULATOR | 04713 | SC75012P |
| U634 | 155-0145-00 | | MICROCIRCUIT,LI:DUAL IN-LINE,16 LEAD | 80009 | 155-0145-00 |
| U678 | 156-0422-00 | | MICROCIRCUIT,DI:UP/DOWN SYNC BINARY COUNTER | 07263 | 74LS191PC OR DC |
| U698 | 156-0382-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE | 01295 | SN74LS00(N OR J) |
| U728 | 156-0464-00 | | MICROCIRCUIT,DI:DUAL 4-INPUT NAND GATE | 07263 | 74LS20PC OR DC |
| U781 | 156-0733-00 | | MICROCIRCUIT,DI:DUAL MONOSTABLE MV | 80009 | 156-0733-00 |
| U782 | 156-0388-00 | | MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP | 80009 | 156-0388-00 |
| U786 | 156-0733-00 | | MICROCIRCUIT,DI:DUAL MONOSTABLE MV | 80009 | 156-0733-00 |
| U788 | 156-0733-00 | | MICROCIRCUIT,DI:DUAL MONOSTABLE MV | 80009 | 156-0733-00 |
| U801 | 156-0388-00 | | MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP | 80009 | 156-0388-00 |
| U802 | 156-0479-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT OR GATE | 27014 | DM74LS32N |
| U821 | 156-0383-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NOR GATE | 80009 | 156-0383-00 |
| U822 | 156-0392-00 | | MICROCIRCUIT,DI:QUAD LATCH W/CLEAR | 34335 | SN74LS175N OR J |
| U841 | 156-0905-03 | | MICROCIRCUIT,DI:PROM,PROGRAMMED | 80009 | 156-0905-03 |
| U842 | 156-0617-00 | | MICROCIRCUIT,DI:DUAL 4 BIT BIN COUNTER | 01295 | SN74393N |
| U864 | 156-0733-00 | | MICROCIRCUIT,DI:DUAL MONOSTABLE MV | 80009 | 156-0733-00 |
| U868 | 156-0784-00 | B010100 B020428 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 01295 | SN74LS163AN |
| U868 | 156-0784-02 | B020429 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 27014 | DM74LS163ANA + |
| U882 | 156-0905-06 | | MICROCIRCUIT,DI:PROM,PROGRAMMED | 80009 | 156-0905-06 |
| U884 | 156-0905-05 | | MICROCIRCUIT,DI:PROM,PROGRAMMED | 80009 | 156-0905-05 |
| U886 | 156-0382-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE | 01295 | SN74LS00(N OR J) |
| U888 | 156-0905-04 | | MICROCIRCUIT,DI:PROM,PROGRAMMED | 80009 | 156-0905-04 |
| U894 | 156-0392-00 | | MICROCIRCUIT,DI:QUAD LATCH W/CLEAR | 34335 | SN74LS175N OR J |
| U896 | 156-0382-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE | 01295 | SN74LS00(N OR J) |
| U898 | 156-0392-00 | | MICROCIRCUIT,DI:QUAD LATCH W/CLEAR | 34335 | SN74LS175N OR J |
| U908 | 156-0392-00 | | MICROCIRCUIT,DI:QUAD LATCH W/CLEAR | 34335 | SN74LS175N OR J |
| U963 | 156-0067-11 | B010100 B010346 | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 02735 | CA741CE |
| U963 | 156-0700-01 | B010347 | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 02735 | CA741S |
| U978 | 156-0644-02 | | MICROCIRCUIT,DI:QUAD BILATERAL SWITCH | 02735 | CD4066BF |
| U985 | 156-0742-00 | | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 27014 | LM318N |
| U1034 | 156-0130-00 | B010100 B020428 | MICROCIRCUIT,LI:MODULATOR/DEMODULATOR | 80009 | 156-0130-00 |
| U1034 | 156-0130-02 | B020429 | MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN | 04713 | SC77162GH |
| U1055 | 156-0742-00 | | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 27014 | LM318N |
| U1072 | 156-0259-00 | | MICROCIRCUIT,LI:5 TRANSISTOR ARRAY | 02735 | CA3083 |
| U1073 | 156-0718-00 | | MICROCIRCUIT,DI:TRIPLE 3-INP POS-NOR GATES | 80009 | 156-0718-00 |
| U1074 | 156-0382-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE | 01295 | SN74LS00(N OR J) |
| U1076 | 156-0707-00 | | MICROCIRCUIT,DI:QUAD 2-INPUT EXCL OR GATE | 01295 | SN74S86N |
| U1077 | 156-0784-00 | B010100 B020428 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 01295 | SN74LS163AN |
| U1077 | 156-0784-02 | B020429 | MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER | 27014 | DM74LS163ANA + |

Replaceable Electrical Parts—143

| Ckt No. | Tektronix Part No. | Serial/Model No. Eff | Discont | Name & Description | Mfr Code | Mfr Part Number |
|---------|-----------------------|-------------------------|---------|--|-------------|------------------|
| U1109 | 156-0251-00 | B010100 B010347 | B010346 | MICROCIRCUIT,DI:VOLTAGE COMPENSATOR | 27014 | LM361H |
| U1145 | 156-0067-11 | | | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 02735 | CA741CE |
| U1145 | 156-0700-01 | | | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 02735 | CA741S |
| U1147 | 156-0259-00 | | | MICROCIRCUIT,LI:5 TRANSISTOR ARRAY | 02735 | CA3083 |
| U1167 | 156-0259-00 | | | MICROCIRCUIT,LI:5 TRANSISTOR ARRAY | 02735 | CA3083 |
| U1197 | 156-0259-00 | | | MICROCIRCUIT,LI:5 TRANSISTOR ARRAY | 02735 | CA3083 |
| U1202 | 156-0901-00 | | | MICROCIRCUIT,LI:OPNL TRANSCONDUCTANCE AMPL | 02735 | CA3060E |
| U1222 | 156-0223-00 | | | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 27014 | LM308H |
| U1241 | 156-0356-00 | | | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 80009 | 156-0356-00 |
| U1252 | 156-0644-00 | | | MICROCIRCUIT,DI:QUAD BILATERAL SWITCH | 80009 | 156-0644-00 |
| U1280 | 156-0742-00 | | | MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER | 27014 | LM318N |
| U1297 | 156-0158-05 | B010100 | B010346 | MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER | 80009 | 156-0158-05 |
| U1297 | 156-0158-04 | B010347 | | MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER | 01295 | N99320JG |
| U1352 | 156-0251-00 | | | MICROCIRCUIT,DI:VOLTAGE COMPENSATOR | 27014 | LM361H |
| U1412 | 156-0130-00 | B010100 | B020428 | MICROCIRCUIT,LI:MODULATOR/DEMODULATOR | 80009 | 156-0130-00 |
| U1412 | 156-0130-02 | B020429 | | MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN | 04713 | SC77162GH |
| U1417 | 156-0130-01 | | | MICROCIRCUIT,LI:MODULATOR/DEMODULATOR | 04713 | MC1596G |
| U1481 | 156-0382-00 | | | MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE | 01295 | SN74LS00(N OR J) |
| VR31 | 152-0212-00 | B010100 B020000 | B019999 | SEMICONV DEVICE:ZENER,0.5W,9V,5% | 04713 | SZ50646RL |
| VR240 | 152-0278-00 | | | SEMICONV DEVICE:ZENER,0.4W,3V,5% | 04713 | SZG35009K20 |
| VR304 | 152-0195-00 | | | SEMICONV DEVICE:ZENER,0.4W,5.1V,5% | 04713 | SZ11755 |
| VR427 | 152-0278-00 | | | SEMICONV DEVICE:ZENER,0.4W,3V,5% | 04713 | SZG35009K20 |
| VR449 | 152-0306-00 | | | SEMICONV DEVICE:ZENER,0.4W,9.1V,5% | 15238 | Z5409 |
| VR462 | 152-0306-00 | | | SEMICONV DEVICE:ZENER,0.4W,9.1V,5% | 15238 | Z5409 |
| VR662 | 152-0227-00 | | | SEMICONV DEVICE:ZENER,0.4W,6.2V,5% | 04713 | SZ13903 |
| VR691 | 152-0227-00 | | | SEMICONV DEVICE:ZENER,0.4W,6.2V,5% | 04713 | SZ13903 |
| VR741 | 152-0227-00 | | | SEMICONV DEVICE:ZENER,0.4W,6.2V,5% | 04713 | SZ13903 |
| VR839 | 152-0227-00 | | | SEMICONV DEVICE:ZENER,0.4W,6.2V,5% | 04713 | SZ13903 |
| VR1256 | 152-0127-00 | | | SEMICONV DEVICE:ZENER,0.4W,7.5V,5% | 04713 | SZG35009K2 |
| Y128 | 158-0130-00 | | | XTAL UNIT,QTZ:8.8125 MHZ,0.0035%,PARALLEL | 33096 | OBD |



SCHEMATIC EXAMPLE

DIAGRAMS & CIRCUIT BOARD ILLUSTRATIONS

This section of the manual contains block and schematic diagrams with waveforms, and etched circuit board illustrations.

Symbols

Symbols used on the diagrams are based on ANSI Y32.2-1975 and IEEE No. 315 March 1971. Logic symbology is based on ANSI Y32.14-1973 (IEEE Std. 91-1973). Logic symbols depict the logic function performed and may differ from the manufacturer's data.

Component values

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μ F).

Resistors = Ohms (Ω).

Semiconductor Types

Refer to the Replaceable Electrical Parts list.

Reference Designators

The following letters are used as reference designators to identify components or assemblies on Tektronix, Inc. schematic diagrams.

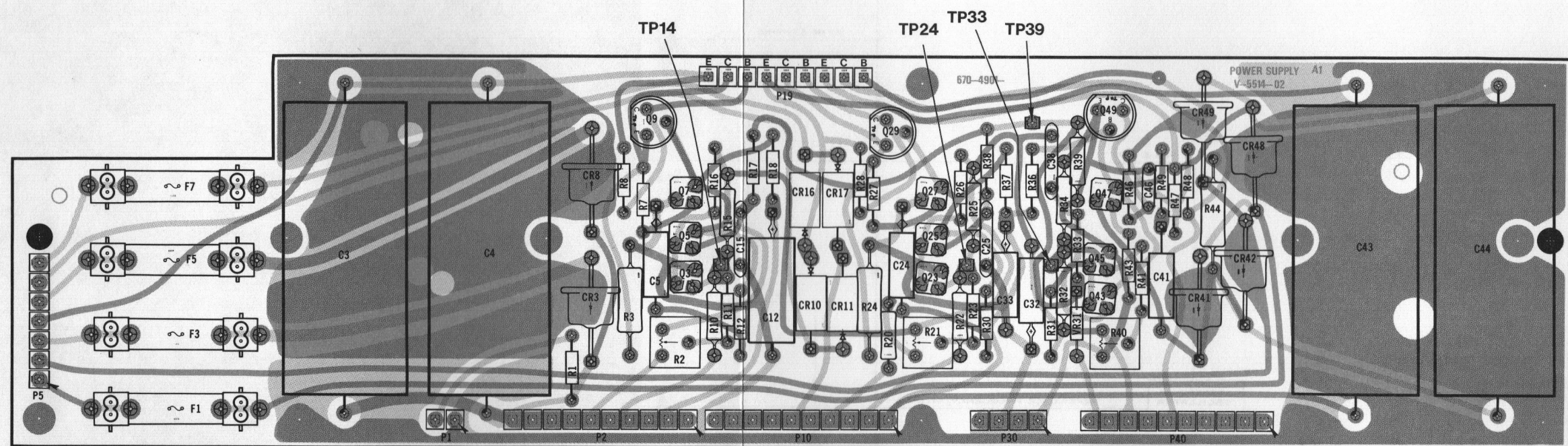
| | | | |
|-----------|--|-----------|---|
| A | Assembly, separable or repairable (circuit board, etc.) | LR | Inductor/resistor combination |
| AT | Attenuator, fixed or variable | M | Meter |
| B | Motor | P | Connector, movable portion |
| BT | Battery | Q | Transistor, silicon-controlled rectifier, or program- mable unijunction transistor |
| C | Capacitor, fixed or variable | R | Resistor, fixed or variable |
| CR | Diode, signal or rectifier | RT | Thermistors |
| DH | Decoupling Hybrid | S | Switch |
| DL | Delay Line | T | Transformer |
| DS | Indicating device (lamp) | TC | Thermocouple |
| E | Spark Gap | TP | Test Point |
| F | Fuse | U | Assembly, inseparable or non-repairable (integrated circuit, etc.) |
| FL | Filter | V | Electron tube |
| H | Heat dissipating device (heat sink, heat radiator, etc.) | VR | Voltage regulator (zener diode, etc.) |
| HR | Heater | Y | Crystal |
| J | Connector, stationary portion | | |
| K | Relay | | |
| L | Inductor, fixed or variable | | |

Partial Schematic Diagram With Explanations

The partial diagram at the left is an example of the various symbols and other information provided on Tektronix, Inc. diagrams.

WAVEFORM CONDITIONS

**All 143 Switches in up
or NORMAL SIGNAL Position**

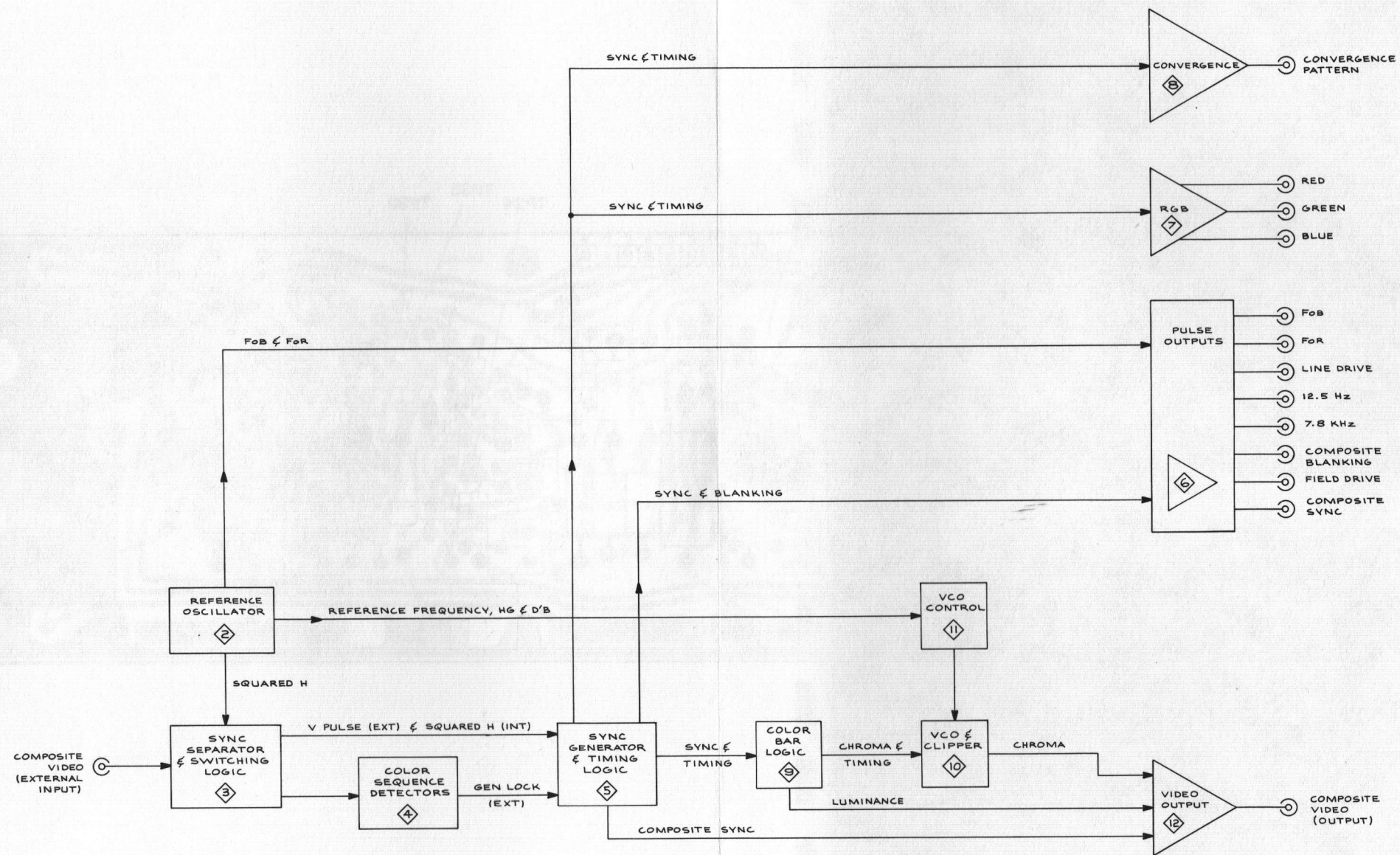


↑
CIRCUIT
NUMBERING
SEQUENCE
→

A1 Power Supply Circuit Board

TOP

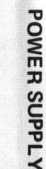
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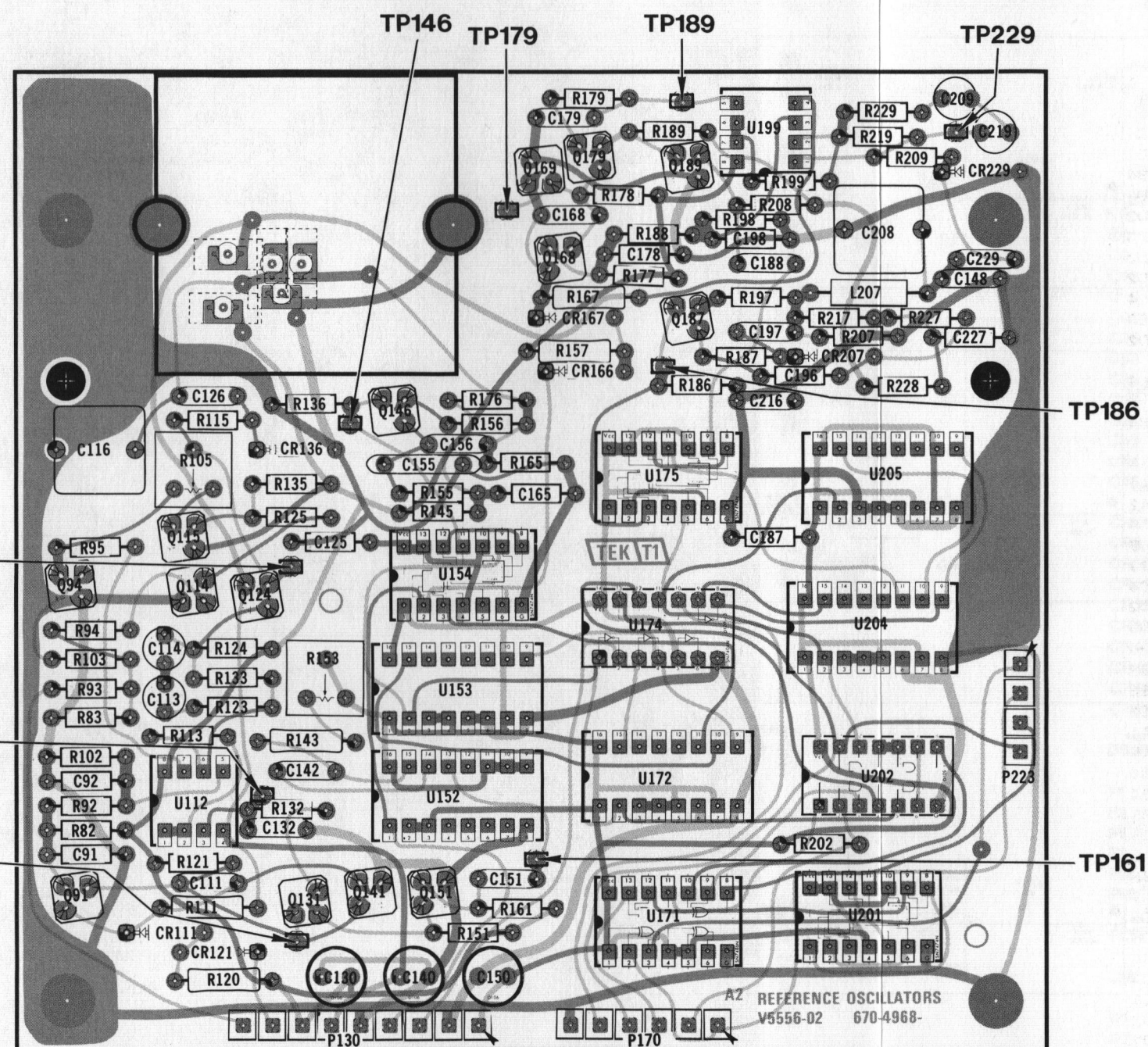
1

POWER SUPPLY PARTS LOCATING CHART

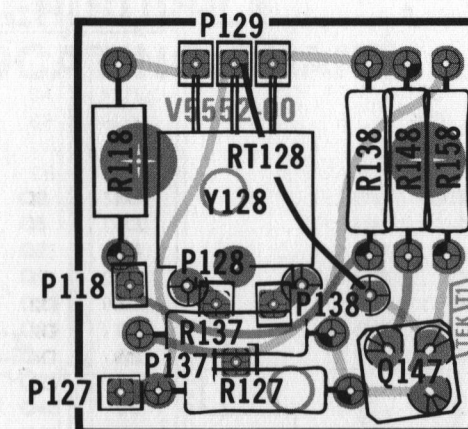
| | | | | | |
|------|----|-----|----|------|----|
| C3 | B2 | Q3 | B3 | R41 | D3 |
| C4 | B2 | Q5 | B3 | R43 | C3 |
| C5 | B4 | Q7 | B4 | R44 | C4 |
| C12 | B5 | Q9 | B4 | R46 | D4 |
| C15 | B3 | Q23 | A3 | R47 | D4 |
| C24 | A4 | Q25 | A3 | R48 | D4 |
| C25 | A3 | Q27 | A4 | R49 | C4 |
| C32 | D5 | Q29 | A4 | | |
| C33 | A5 | Q43 | D3 | S98 | B1 |
| C38 | D3 | Q45 | D3 | | |
| C41 | C4 | Q47 | C3 | T98 | A1 |
| C43 | A2 | Q49 | C4 | | |
| C44 | C2 | Q80 | D5 | TP14 | B3 |
| C46 | C4 | Q97 | B5 | TP24 | A3 |
| | | Q99 | A5 | TP33 | D3 |
| | | | | TP39 | D4 |
| CR3 | B2 | R1 | D2 | | |
| CR8 | B2 | R2 | B3 | VR31 | D4 |
| CR10 | A2 | R3 | B4 | | |
| CR11 | A2 | R7 | B4 | | |
| CR16 | A2 | R8 | B4 | | |
| CR17 | A2 | R10 | B3 | | |
| CR41 | C2 | R11 | B3 | | |
| CR42 | C2 | R12 | B4 | | |
| CR48 | C2 | R15 | B3 | | |
| CR49 | C2 | R16 | B3 | | |
| | | R17 | B3 | | |
| DS98 | D1 | R18 | B3 | | |
| | | R20 | A3 | | |
| F1 | C2 | R21 | A3 | | |
| F3 | B2 | R22 | A3 | | |
| F5 | B2 | R23 | A3 | | |
| F7 | A2 | R24 | A4 | | |
| F96 | A1 | R25 | A3 | | |
| F98 | C1 | R26 | A3 | | |
| | | R27 | A4 | | |
| FL98 | C1 | R28 | A4 | | |
| | | R30 | A4 | | |
| J98 | C1 | R31 | D3 | | |
| | | R32 | D3 | | |
| P1 | D2 | R33 | D3 | | |
| P2 | B5 | R34 | C3 | | |
| P5 | A2 | R36 | C3 | | |
| P10 | A5 | R37 | A3 | | |
| P19 | A4 | R38 | A3 | | |
| P19 | D4 | R39 | D4 | | |
| P30 | C5 | R40 | D3 | | |
| P40 | C5 | | | | |



↑
CIRCUIT
NUMBERING
SEQUENCE
→



A2 Reference Oscillator Circuit Board



A3 Oven Circuit Board

TOP

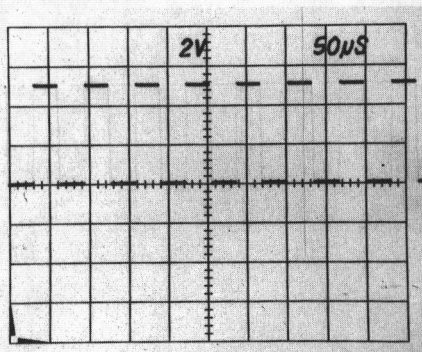
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REFERENCE OSCILLATOR PARTS LOCATING CHART

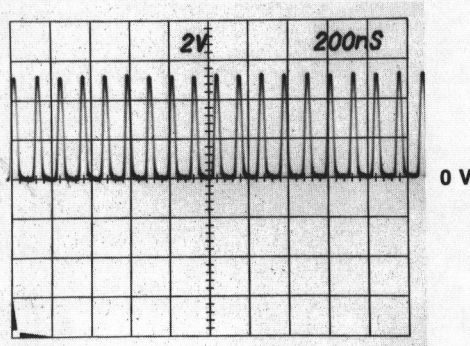
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|-------|----|------|----|-------|----|
| C91 | B1 | Q124 | A3 | R198 | D1 |
| C92 | B1 | Q129 | B3 | R199 | D2 |
| C111 | B1 | Q131 | A2 | R202 | B4 |
| C113 | A2 | Q141 | B2 | R207 | D3 |
| C114 | A3 | Q146 | B4 | R208 | D2 |
| C116 | B3 | Q147 | C4 | R209 | D3 |
| C125 | A4 | Q151 | B2 | R217 | D3 |
| C126 | A3 | Q168 | D1 | R219 | D2 |
| C130 | C1 | Q169 | D2 | R227 | D4 |
| C132 | B2 | Q179 | D2 | R228 | C3 |
| C140 | C1 | Q187 | D4 | R229 | D2 |
| C142 | B2 | Q189 | D2 | | |
| C148 | D3 | | | RT128 | B3 |
| C150 | C1 | R82 | A1 | | |
| C151 | B2 | R83 | C3 | S91 | B4 |
| C155 | A4 | R92 | B1 | | |
| C156 | A4 | R93 | B2 | TP105 | B3 |
| C165 | A4 | R94 | B3 | TP131 | A1 |
| C168 | D2 | R95 | B3 | TP132 | A2 |
| C178 | D1 | R102 | B1 | TP146 | A4 |
| C179 | D2 | R103 | B3 | TP161 | B2 |
| C187 | D4 | R105 | A3 | TP179 | D1 |
| C188 | D3 | R111 | B1 | TP186 | D4 |
| C196 | D4 | R113 | A2 | TP189 | D2 |
| C197 | D3 | R115 | A3 | TP229 | D3 |
| C198 | D1 | R118 | C4 | | |
| C208 | D3 | R120 | B1 | U112A | B2 |
| C209 | D2 | R121 | A2 | U112B | B2 |
| C216 | D3 | R123 | A2 | U152A | C2 |
| C219 | D3 | R124 | A3 | U153 | A4 |
| C227 | D3 | R125 | B3 | U154A | A5 |
| C229 | D3 | R127 | B3 | U154B | A4 |
| | | R132 | B2 | U171A | B4 |
| CR111 | B1 | R133 | A2 | U171C | B5 |
| CR121 | B1 | R135 | A3 | U171D | B5 |
| CR136 | A3 | R136 | B4 | U172 | A5 |
| CR166 | D1 | R137 | B3 | U174A | B5 |
| CR167 | D1 | R138 | C3 | U174B | A5 |
| CR207 | D4 | R143 | B2 | U174D | C5 |
| CR229 | D3 | R145 | A4 | U174E | D5 |
| | | R148 | C3 | U174F | B4 |
| L207 | D3 | R151 | A2 | U175A | D4 |
| | | R153 | B2 | U175B | C5 |
| P118 | C3 | R155 | A4 | U199A | D2 |
| P127 | C3 | R156 | A4 | U199B | D2 |
| P128 | B3 | R157 | D1 | U201A | C4 |
| P130 | C1 | R158 | C3 | U201B | C5 |
| P130 | B1 | R161 | B2 | U202A | B5 |
| P130 | A5 | R165 | B3 | U202B | B5 |
| P137 | C3 | R167 | D1 | U202C | B5 |
| P138 | B3 | R176 | A3 | U202D | B5 |
| P170 | B4 | R177 | D1 | U204 | D5 |
| P170 | D5 | R178 | D2 | U205 | D4 |
| P223 | B5 | R179 | D2 | | |
| | | R186 | D4 | Y128 | B3 |
| Q91 | A1 | R187 | D4 | | |
| Q99 | B3 | R188 | D1 | | |
| Q114 | B3 | R189 | D2 | | |
| Q115 | A3 | R197 | D3 | | |

WAVEFORMS

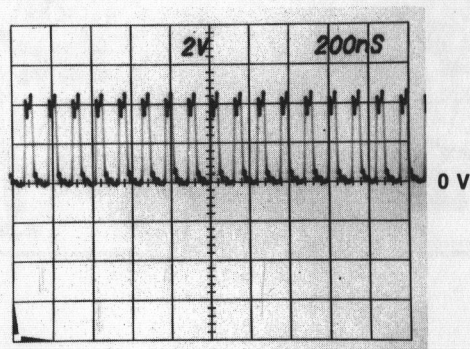
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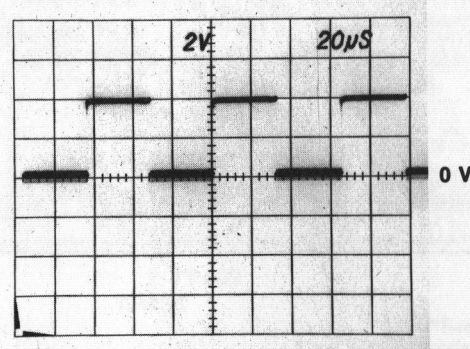
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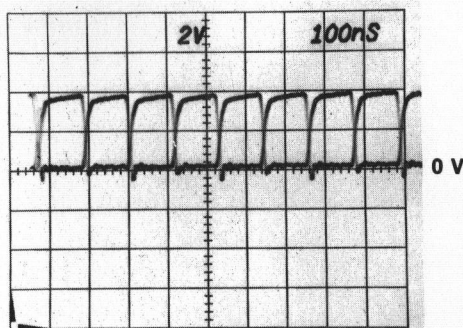
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3

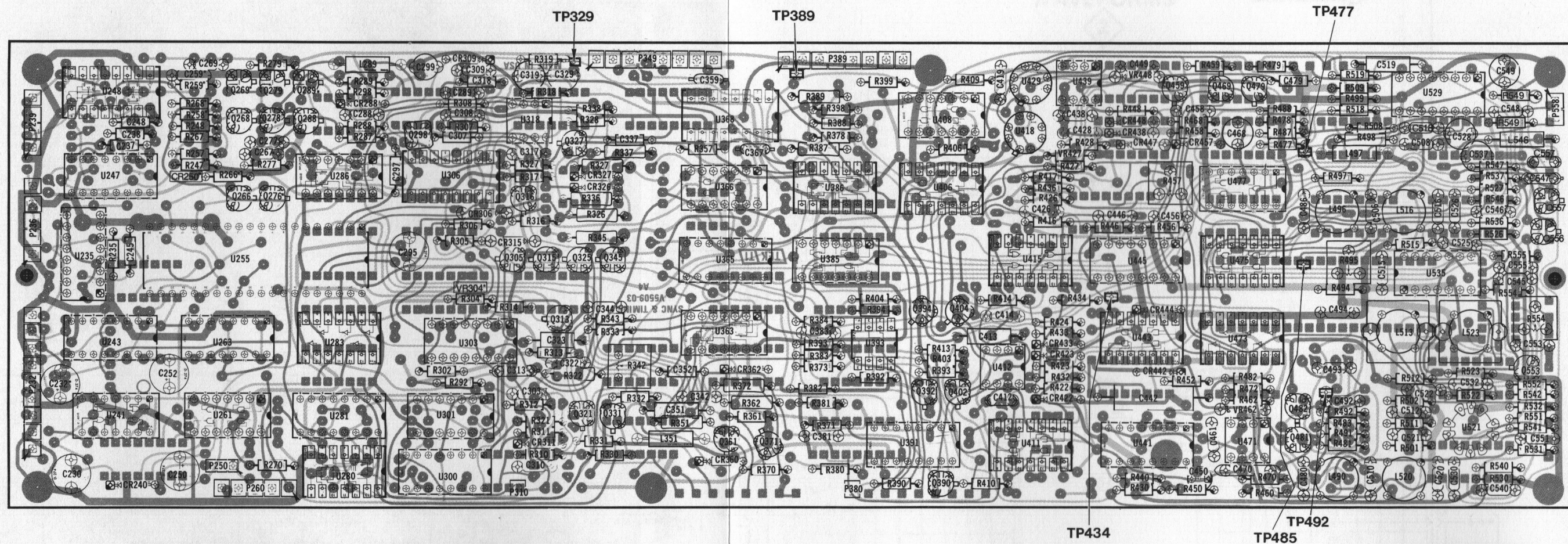


4



5

7.8 kHz TRIGGER



CIRCUIT
NUMBERING
SEQUENCE

A4 Sync & Timing Circuit Board

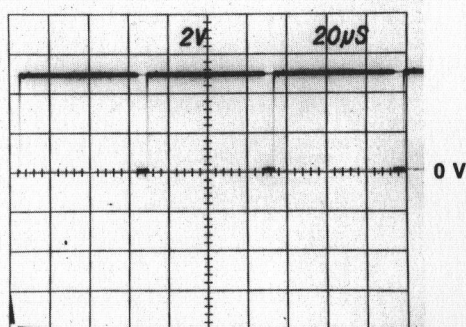
TOP

BOTTOM

*See Parts List for
serial number ranges.

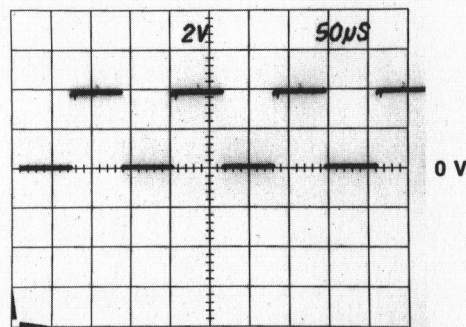
WAVEFORMS

3



1

GEN LOCK TO EXT. SECAM



2

GEN LOCK TO EXT. SOURCE
7.8 kHz TRIGGER

3

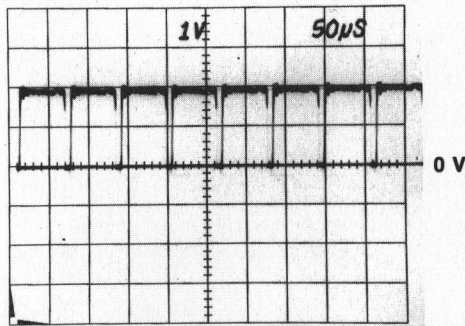
SYNC SEPARATOR & SYNC SWITCHING LOGIC PARTS LOCATING CHART

| | | | | | | | |
|-------|----|------|----|-------|----|-------|----|
| C310 | A4 | P389 | B1 | R387 | C4 | U406A | B2 |
| C323 | B5 | P389 | B5 | R388 | C1 | U406B | C2 |
| C342 | B3 | P389 | C5 | R389 | C3 | U406C | C1 |
| C351 | B3 | P389 | C5 | R398 | C1 | U408A | B2 |
| C359 | B2 | P389 | C1 | R399 | B5 | U408B | B2 |
| C367 | B4 | P558 | A1 | R406 | B1 | U408C | C3 |
| C381 | B3 | | | R409 | B1 | U408D | B2 |
| C508 | B1 | Q321 | B4 | R498 | A1 | U477B | B2 |
| C518 | B2 | Q331 | B4 | R499 | A2 | U529 | B2 |
| C519 | A2 | Q361 | B3 | R508 | A1 | | |
| C528 | A1 | Q371 | A3 | R509 | A2 | | |
| C548 | A1 | | | R518 | A2 | | |
| C549 | B2 | | | R519 | A2 | | |
| | | | | R548 | A1 | | |
| | | | | R549 | A1 | | |
| CR311 | A4 | R88 | A1 | | | | |
| CR360 | A3 | R270 | B4 | | | | |
| CR362 | B3 | R302 | B4 | S96 | C1 | | |
| | | R310 | A4 | S97 | C1 | | |
| | | R311 | A5 | S577 | D3 | | |
| DS96 | B5 | R313 | B5 | | | | |
| | | R321 | B5 | TP389 | B3 | | |
| J88 | A1 | R330 | A4 | TP485 | A2 | | |
| J89 | A1 | R331 | B4 | | | | |
| | | R332 | B4 | | | | |
| L548 | A1 | R351 | A3 | U280B | B4 | | |
| L351 | B3 | R361 | B3 | U300B | B4 | | |
| | | R362 | A3 | U301 | B5 | | |
| P250 | C5 | R370 | A3 | U303A | B5 | | |
| P260 | C5 | R371 | B3 | U366A | C3 | | |
| P349 | B5 | R372 | A3 | U368A | C4 | | |
| P349 | C5 | R378 | C1 | U368B | C3 | | |
| P349 | C1 | R381 | B3 | U385A | C3 | | |
| P349 | C5 | R382 | A3 | U385B | B2 | | |
| | | | | U386A | B2 | | |



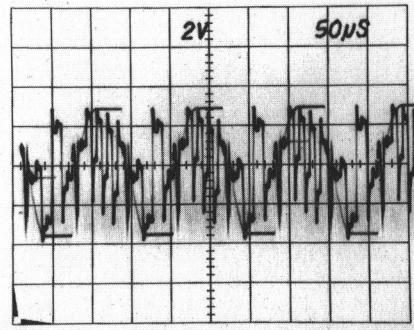
WAVEFORMS

4



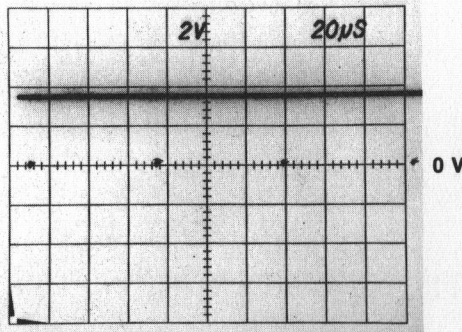
1

GEN LOCK TO EXT. SECAM



2

GEN LOCK TO EXT. SECAM
AC COUPLED
7.8 kHz TRIGGER

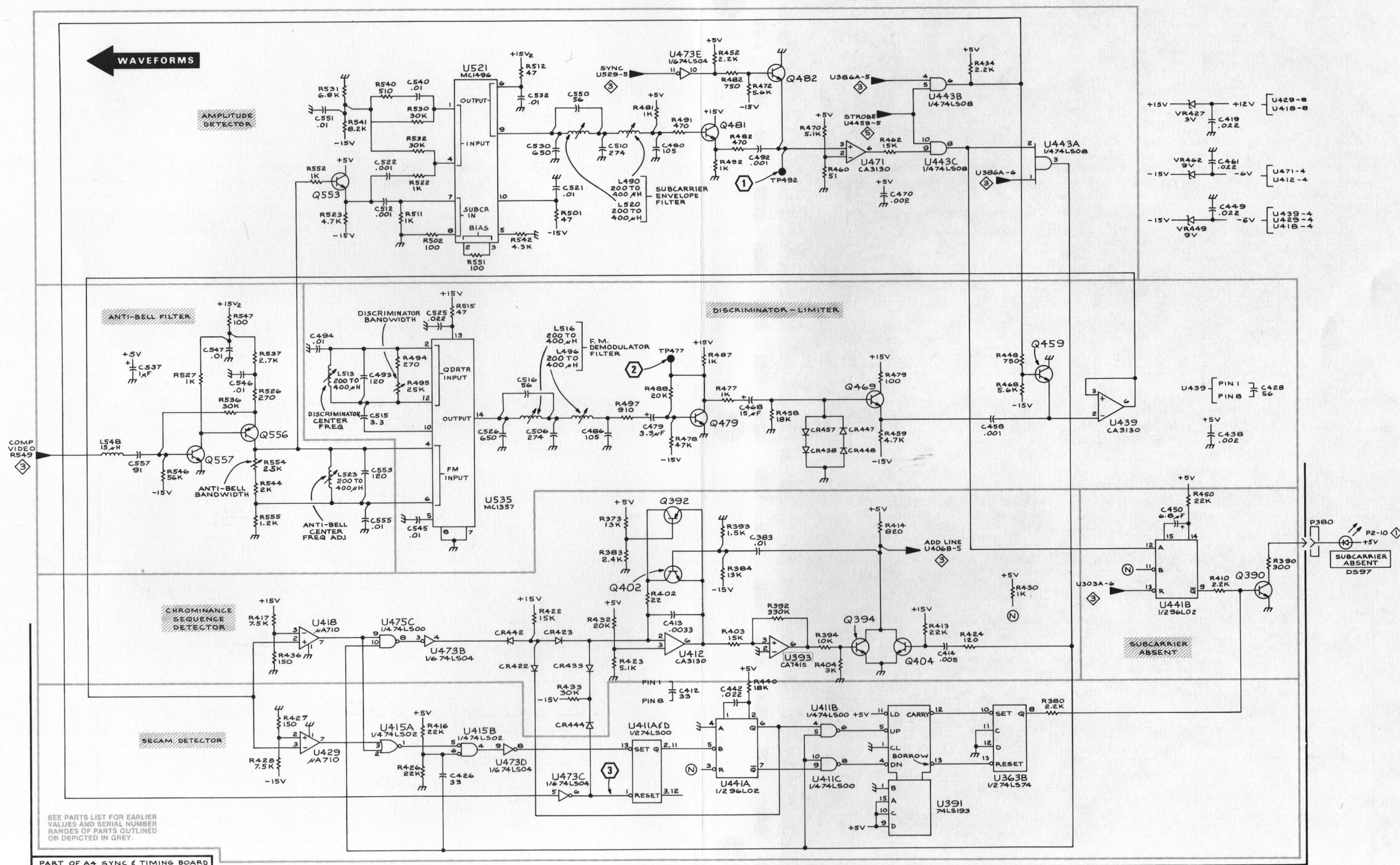


3

4

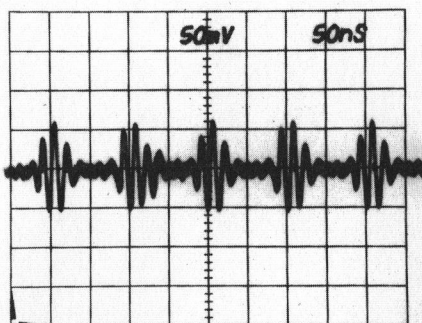
COLOR SEQUENCE DETECTORS PARTS LOCATING CHART

| | | | | | | | | | | | | | |
|------|----|-------|----|------|----|------|----|------|----|-------|----|-------|----|
| C383 | C3 | C522 | A2 | L490 | A3 | R384 | C3 | R458 | B3 | R526 | B2 | U412 | C3 |
| C412 | D3 | C525 | B2 | L496 | B3 | R390 | C5 | R459 | B4 | R527 | B1 | U415A | D2 |
| C413 | C3 | C526 | B2 | L513 | B2 | R392 | C3 | R460 | A4 | R531 | A2 | U415B | D2 |
| C414 | C4 | C530 | A3 | L516 | B3 | R393 | C3 | R462 | A4 | R532 | A2 | U418 | C2 |
| C419 | A5 | C532 | A2 | L520 | A3 | R394 | C4 | R468 | B4 | R536 | B1 | U429 | D2 |
| C426 | D2 | C537 | B1 | L523 | C2 | R403 | C3 | R470 | A4 | R537 | B2 | U439 | B5 |
| C428 | B5 | C540 | A2 | L548 | B1 | R404 | D4 | R472 | A3 | R540 | A2 | U441A | D3 |
| C438 | B5 | C545 | C2 | | | R410 | C5 | R477 | B3 | R541 | A2 | U441B | C5 |
| C442 | D3 | C546 | B1 | P380 | C5 | R413 | C4 | R478 | B3 | R542 | A2 | U443A | A4 |
| C449 | A5 | C547 | B1 | | | R414 | C4 | R479 | B4 | R544 | C2 | U443B | A4 |
| C450 | C5 | C550 | A3 | Q390 | C5 | R416 | D2 | R481 | A3 | R546 | C1 | U443C | A4 |
| C458 | B4 | C551 | A2 | Q392 | C3 | R417 | C2 | R482 | A3 | R547 | B1 | U471 | A4 |
| C461 | A5 | C553 | C2 | Q394 | C4 | R422 | C3 | R483 | A3 | R551 | B2 | U473B | C2 |
| C468 | B3 | C555 | C2 | Q402 | C3 | R423 | C3 | R487 | B3 | R552 | A2 | U473C | D3 |
| C470 | A4 | C557 | C1 | Q404 | C4 | R424 | C4 | R488 | B3 | R554 | C2 | U473D | D2 |
| C479 | B3 | | | Q459 | B4 | R426 | D2 | R491 | A3 | R555 | C2 | U473E | A3 |
| C480 | A3 | CR422 | D2 | Q469 | B4 | R427 | D2 | R492 | A3 | | | U475C | C2 |
| C486 | B3 | CR423 | C3 | Q479 | B3 | R428 | D2 | R494 | B2 | TP477 | B3 | U521 | A2 |
| C492 | A3 | CR433 | D3 | Q481 | A3 | R430 | C4 | R495 | B2 | TP492 | A3 | U535 | C2 |
| C493 | B2 | CR438 | B4 | Q482 | A3 | R432 | C3 | R497 | B3 | | | | |
| C494 | B2 | CR442 | C2 | Q553 | A2 | R433 | D3 | R501 | A3 | U363B | D4 | VR427 | A5 |
| C506 | B3 | CR444 | D3 | Q556 | B1 | R434 | A4 | R502 | A2 | U391 | D4 | VR449 | A5 |
| C510 | A3 | CR447 | B4 | Q557 | B1 | R436 | C2 | R511 | A2 | U393 | C3 | VR462 | A5 |
| C512 | A2 | CR448 | B4 | | | R440 | D3 | R512 | A2 | U411A | D3 | | |
| C515 | B2 | CR457 | B4 | R373 | C3 | R448 | B4 | R515 | B2 | U411B | D4 | | |
| C516 | B2 | | | R380 | D4 | R450 | C5 | R522 | A2 | U411C | D4 | | |
| C521 | A3 | DS97 | C5 | R383 | C3 | R452 | A3 | R523 | A2 | U411D | D3 | | |



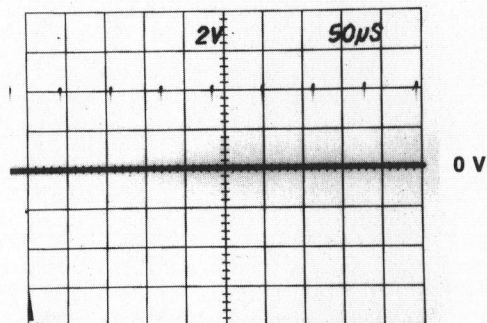
WAVEFORMS

5



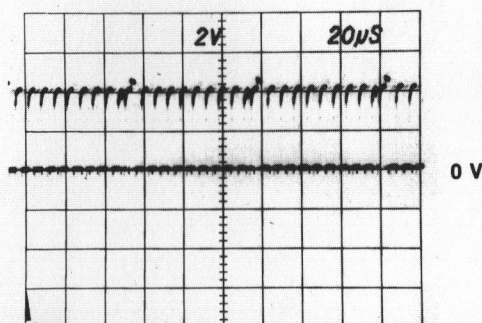
1

GEN LOCK TO EXT. SECAM
AC COUPLED



2

GEN LOCK TO EXT. SECAM

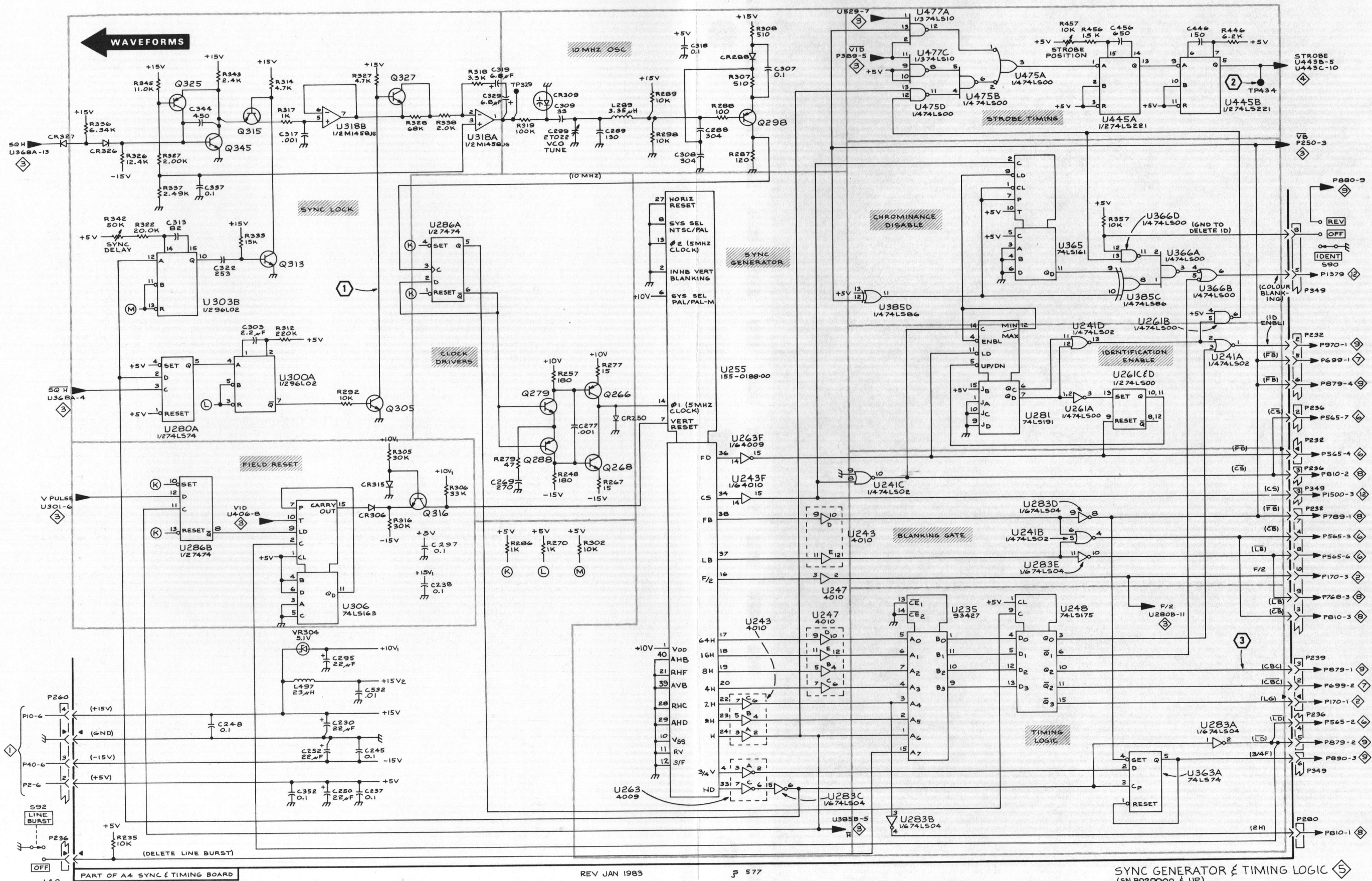


3

5

SYNC GENERATOR & TIMING LOGIC PARTS LOCATING CHART (SN B020000 & UP)

| | | | | | | | | | | | | | |
|------|----|-------|----|------|----|------|----|-------|----|-------|----|-------|----|
| C230 | D2 | C337 | A1 | P349 | B5 | R267 | C3 | R327 | A2 | U247 | C4 | U366B | B5 |
| C237 | D2 | C344 | A1 | P349 | C5 | R270 | C3 | R328 | A2 | U248 | C4 | U366D | A5 |
| C238 | A2 | C352 | D2 | | | R277 | B3 | R333 | A1 | U255 | B3 | U385C | B5 |
| C245 | D2 | C446 | A5 | Q266 | B3 | R279 | C3 | R336 | A1 | U261A | B5 | U385D | B4 |
| C248 | D1 | C456 | A5 | Q268 | C3 | R286 | C2 | R337 | A1 | U261B | B5 | U445A | A5 |
| C250 | D2 | C532 | D2 | Q279 | B3 | R287 | A3 | R338 | A2 | U261C | B5 | U445B | A5 |
| C252 | D2 | | | Q288 | C3 | R288 | A3 | R342 | A1 | U261D | B5 | U475A | A4 |
| C269 | C2 | CR250 | B3 | Q298 | A3 | R289 | A3 | R343 | A1 | U263 | C3 | U475B | A4 |
| C277 | B3 | CR288 | A3 | Q305 | B2 | R292 | B2 | R345 | A1 | U263F | B3 | U475D | A4 |
| C288 | A3 | CR306 | C2 | Q313 | B2 | R298 | A3 | R357 | A5 | U280A | B1 | U477A | A4 |
| C289 | A3 | CR309 | A3 | Q315 | A1 | R302 | C3 | R446 | A5 | U281 | B4 | U477C | A4 |
| C295 | D2 | CR315 | C2 | Q316 | C2 | R305 | B2 | R456 | A5 | U283A | D5 | | |
| C297 | C2 | CR326 | A1 | Q325 | A1 | R306 | C2 | S90 | B5 | U283B | D4 | VR304 | C2 |
| C299 | A3 | CR327 | A1 | Q327 | A2 | R307 | A3 | S92 | D1 | U283C | D4 | | |
| C303 | B1 | | | Q345 | A1 | R308 | A3 | | | U283D | C4 | | |
| C307 | A3 | L289 | A3 | | | R312 | B2 | TP329 | A2 | U283E | C4 | | |
| C308 | A3 | L497 | D2 | | | R314 | A2 | TP434 | A5 | U283F | D4 | | |
| C309 | A3 | | | R235 | D1 | R316 | C2 | | | U286A | A2 | | |
| C313 | A1 | P232 | C5 | R248 | C3 | R317 | A2 | U235 | C4 | U286B | C1 | | |
| C317 | A2 | P232 | B5 | R257 | B3 | R318 | A2 | U241A | B5 | U300A | B2 | | |
| C318 | A3 | P236 | D1 | | | R319 | A2 | U241B | C4 | U303B | B1 | | |
| C319 | A2 | P236 | B5 | | | R322 | A1 | U241C | C4 | U306 | C2 | | |
| C322 | B1 | P236 | C5 | | | R326 | A1 | U241D | B5 | U318A | A2 | | |
| C329 | A2 | P236 | D5 | | | R327 | A1 | U243 | C3 | U318B | A2 | | |
| | | P239 | D5 | | | | | U243 | C4 | U363A | D5 | | |
| | | P260 | D1 | | | | | U243 | C4 | U365 | A5 | | |
| | | P280 | D5 | | | | | U243F | C3 | U366A | B5 | | |
| | | P349 | D5 | | | | | | | | | | |

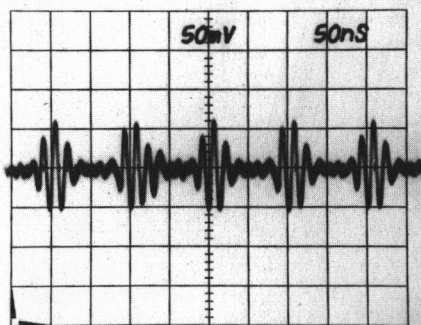


SYNC GEN & TIMING LOGIC
(SN B020000 & UP)

5

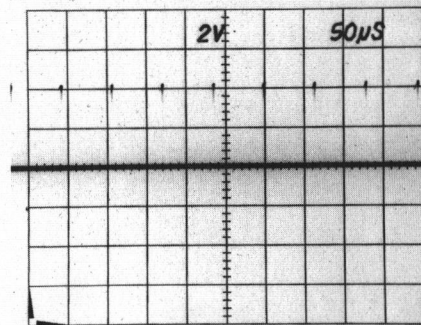
WAVEFORMS

5



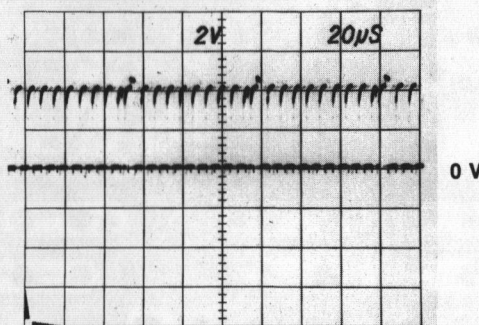
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GEN LOCK TO EXT. SECAM
AC COUPLED



2

GEN LOCK TO EXT. SECAM

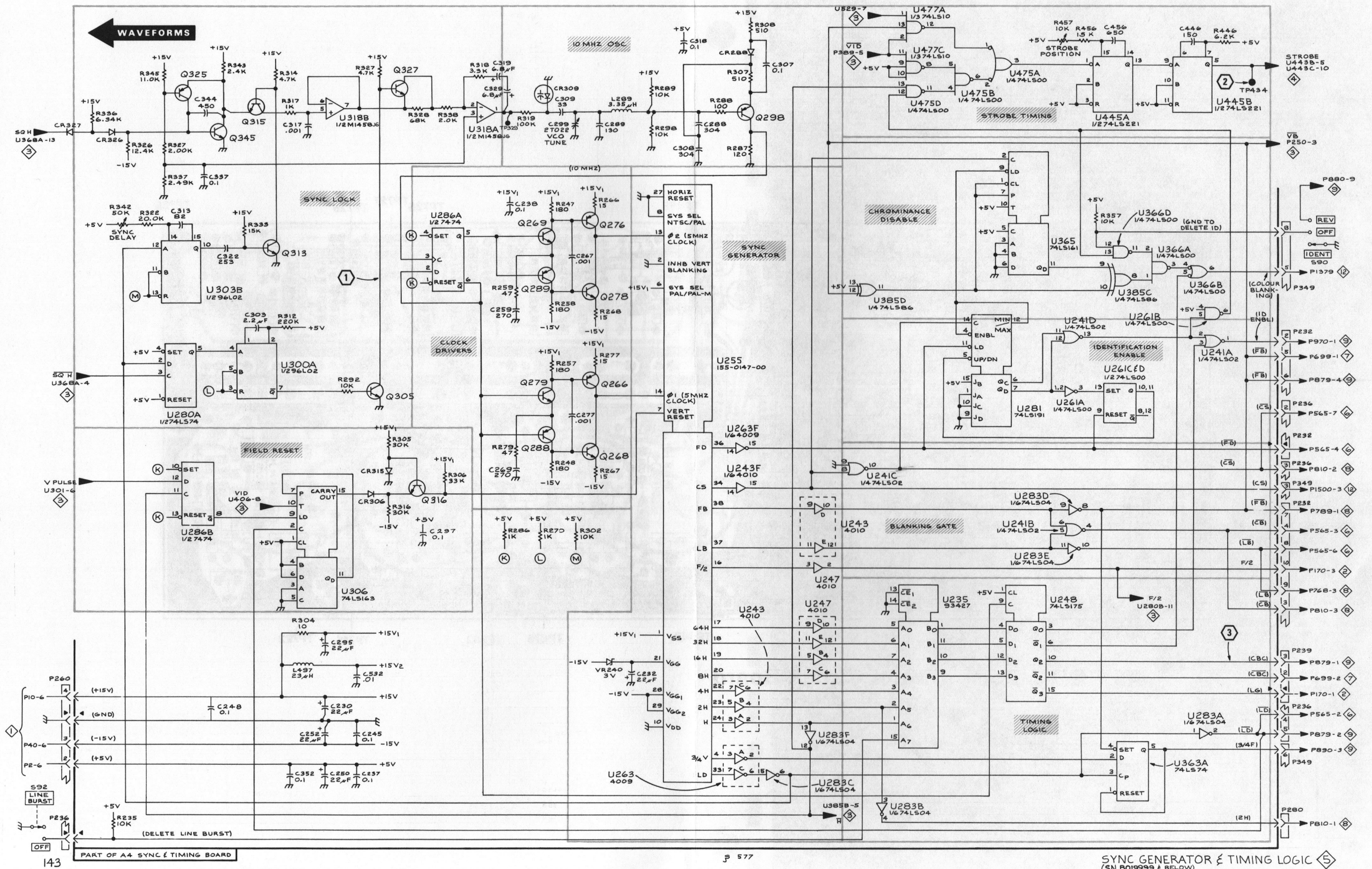


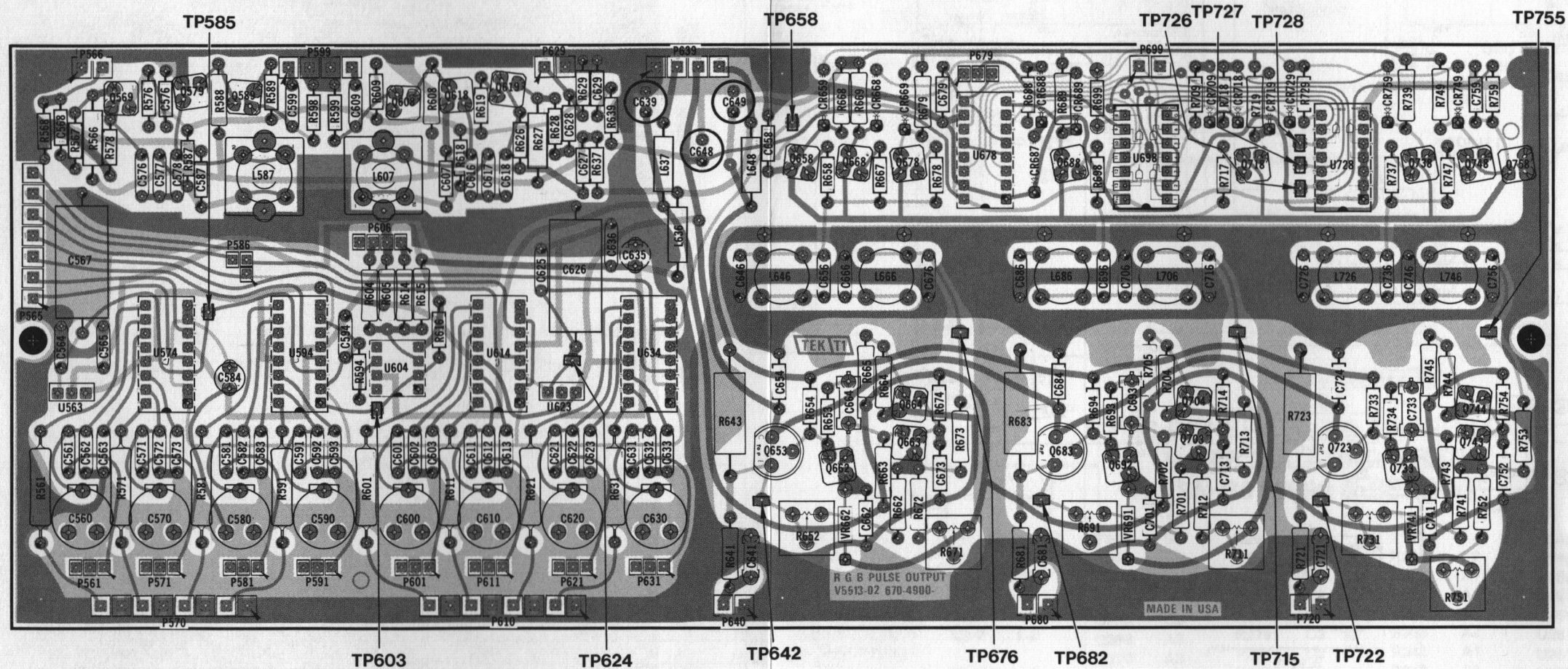
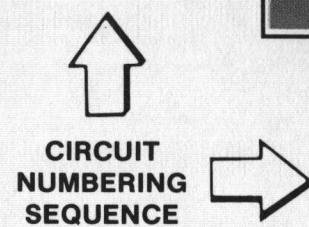
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5

SYNC GENERATOR & TIMING LOGIC PARTS LOCATING CHART (SN B019999 & BELOW)

| | | | | | | | | | | | | | |
|------|----|-------|----|------|----|------|----|-------|----|-------|----|-------|----|
| C230 | D2 | C337 | A1 | P349 | B5 | R266 | A3 | R327 | A2 | U247 | C4 | U366B | B5 |
| C232 | D3 | C344 | A1 | P349 | C5 | R267 | C3 | R328 | A2 | U248 | C4 | U366D | A5 |
| C237 | D2 | C352 | D2 | | | R268 | B3 | R333 | A1 | U255 | B3 | U385C | B5 |
| C238 | A2 | C446 | A5 | Q266 | B3 | R270 | C3 | R336 | A1 | U261A | B5 | U385D | B4 |
| C245 | D2 | C456 | A5 | Q268 | C3 | R277 | B3 | R337 | A1 | U261B | B5 | U445A | A5 |
| C248 | D1 | C532 | D2 | Q269 | A3 | R279 | C3 | R338 | A2 | U261C | B5 | U445B | A5 |
| C250 | D2 | | | Q276 | A3 | R286 | C2 | R342 | A1 | U261D | B5 | U475A | A4 |
| C252 | D2 | CR288 | A3 | Q278 | B3 | R287 | A3 | R343 | A1 | U263 | C3 | U475B | A4 |
| C259 | B2 | CR306 | C2 | Q279 | B3 | R288 | A3 | R345 | A1 | U263F | B3 | U475D | A4 |
| C267 | B3 | CR309 | A3 | Q288 | C3 | R289 | A3 | R357 | A5 | U280A | B1 | U477A | A4 |
| C269 | C2 | CR315 | C2 | C289 | B3 | R292 | B2 | R446 | A5 | U281 | B4 | U477C | A4 |
| C277 | B3 | CR326 | A1 | Q298 | A3 | R298 | A3 | R456 | A5 | U283A | D5 | | |
| C288 | A3 | CR327 | A1 | Q305 | B2 | R302 | C3 | | | U283B | D4 | VR240 | D3 |
| C289 | A3 | | | Q313 | B2 | R304 | C2 | S90 | B5 | U283C | D4 | | |
| C295 | D2 | L289 | A3 | Q315 | A1 | R305 | B2 | S92 | D1 | U283D | C4 | | |
| C297 | C2 | L497 | D2 | Q316 | C2 | R306 | C2 | | | U283E | C4 | | |
| C299 | A3 | | | Q325 | A1 | R307 | A3 | TP329 | A2 | U283F | D4 | | |
| C303 | B1 | P232 | C5 | Q327 | A2 | R308 | A3 | TP434 | A5 | U286A | A2 | | |
| C307 | A3 | P232 | B5 | Q345 | A1 | R312 | B2 | | | U286B | C1 | | |
| C308 | A3 | P236 | D1 | | | R314 | A2 | U235 | C4 | U300A | B2 | | |
| C309 | A3 | P236 | B5 | | | R316 | C2 | U241A | B5 | U303B | B1 | | |
| C313 | A1 | P236 | C5 | R235 | D1 | R317 | A2 | U241B | C4 | U306 | C2 | | |
| C317 | A2 | P236 | D5 | R247 | A3 | R318 | A2 | U241C | C4 | U318A | A2 | | |
| C318 | A3 | P239 | D5 | R248 | C3 | R319 | A2 | U241D | B5 | U318B | A2 | | |
| C319 | A2 | P260 | D1 | R257 | B3 | R322 | A1 | U243 | C3 | U363A | D5 | | |
| C322 | B1 | P280 | D5 | R258 | B3 | R326 | A1 | U243 | C4 | U365 | A5 | | |
| C329 | A2 | P349 | D5 | R259 | B2 | R327 | A1 | U243F | C3 | U366A | B5 | | |





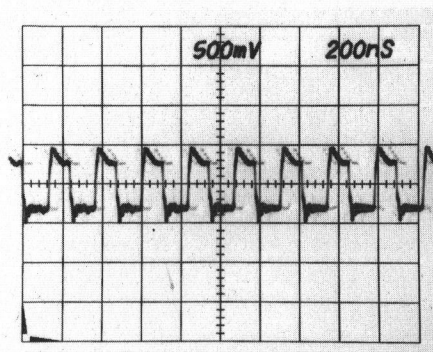
A5 RGB & Pulse Output Circuit Board

TOP

BOTTOM

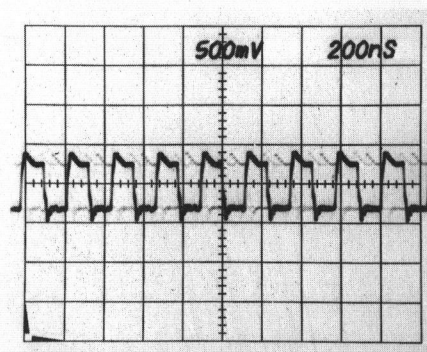
WAVEFORMS

6



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AC COUPLED



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AC COUPLED

6

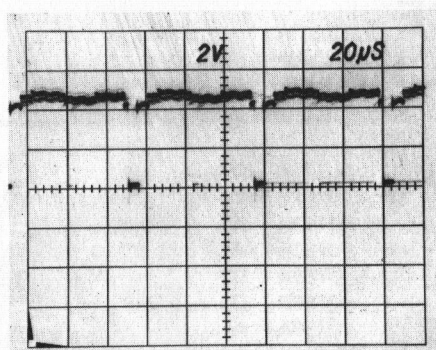
PULSE OUTPUTS PARTS LOCATING CHART

| | | | | | | | |
|------|----|------|----|------|----|-------|----|
| C560 | B4 | C612 | D4 | P566 | A5 | R599 | B1 |
| C561 | B4 | C613 | D3 | P571 | B4 | R601 | C5 |
| C562 | B4 | C616 | A2 | P581 | C4 | R604 | C2 |
| C563 | B3 | C617 | A2 | P586 | C1 | R605 | C2 |
| C564 | B3 | C618 | A2 | P591 | C4 | R608 | B1 |
| C565 | B2 | C620 | D4 | P599 | A1 | R609 | A1 |
| C567 | B3 | C621 | D4 | P601 | C4 | R611 | C5 |
| C568 | A2 | C622 | D4 | P606 | C2 | R614 | C2 |
| C570 | B4 | C623 | D3 | P610 | C5 | R615 | C2 |
| C571 | B4 | C625 | C3 | P611 | D4 | R616 | C2 |
| C572 | B4 | C626 | C3 | P621 | D4 | R618 | A1 |
| C573 | B3 | C628 | A2 | P629 | A5 | R619 | A2 |
| C576 | A2 | C630 | D4 | P631 | D4 | R621 | D5 |
| C577 | A2 | C631 | D4 | | | R626 | A2 |
| C578 | A2 | C632 | D4 | Q569 | A2 | R627 | A2 |
| C580 | C4 | C633 | D3 | Q579 | A1 | R628 | A2 |
| C581 | C4 | C636 | C2 | Q589 | A1 | R629 | A2 |
| C582 | C4 | | | Q608 | A1 | | |
| C583 | C3 | J70 | A5 | Q618 | A1 | TP585 | B3 |
| C584 | C3 | J71 | A5 | Q619 | A2 | TP603 | B2 |
| C587 | A2 | J73 | D5 | | | TP624 | D3 |
| C590 | C4 | J74 | B5 | R561 | B5 | | |
| C591 | C4 | J86 | C5 | R566 | A2 | U563 | B2 |
| C592 | C4 | J87 | B5 | R567 | A2 | U574 | B3 |
| C593 | C3 | J91 | B5 | R568 | A2 | U594 | C3 |
| C594 | C3 | J92 | C5 | R571 | B5 | U604 | C2 |
| C599 | A1 | J93 | C5 | R576 | A2 | U614 | C3 |
| C600 | C4 | J94 | D5 | R578 | A2 | U623 | D2 |
| C601 | C4 | | | R581 | B5 | U634 | D3 |
| C602 | C4 | L587 | A1 | R587 | A1 | | |
| C603 | D3 | L607 | A1 | R588 | A1 | | |
| C607 | A2 | | | R589 | A1 | | |
| C609 | A1 | P561 | B4 | R591 | C5 | | |
| C610 | D4 | P561 | B5 | R594 | C2 | | |
| C611 | D4 | P565 | B1 | R598 | A1 | | |

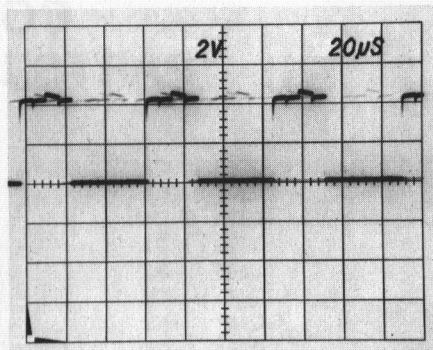


WAVEFORM

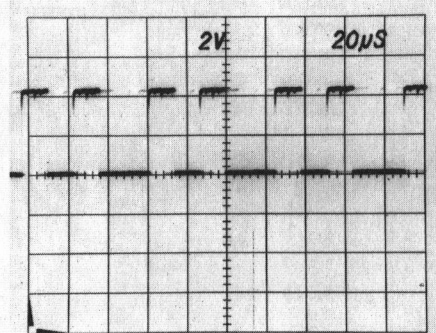
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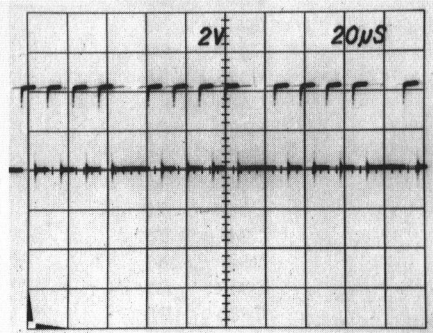
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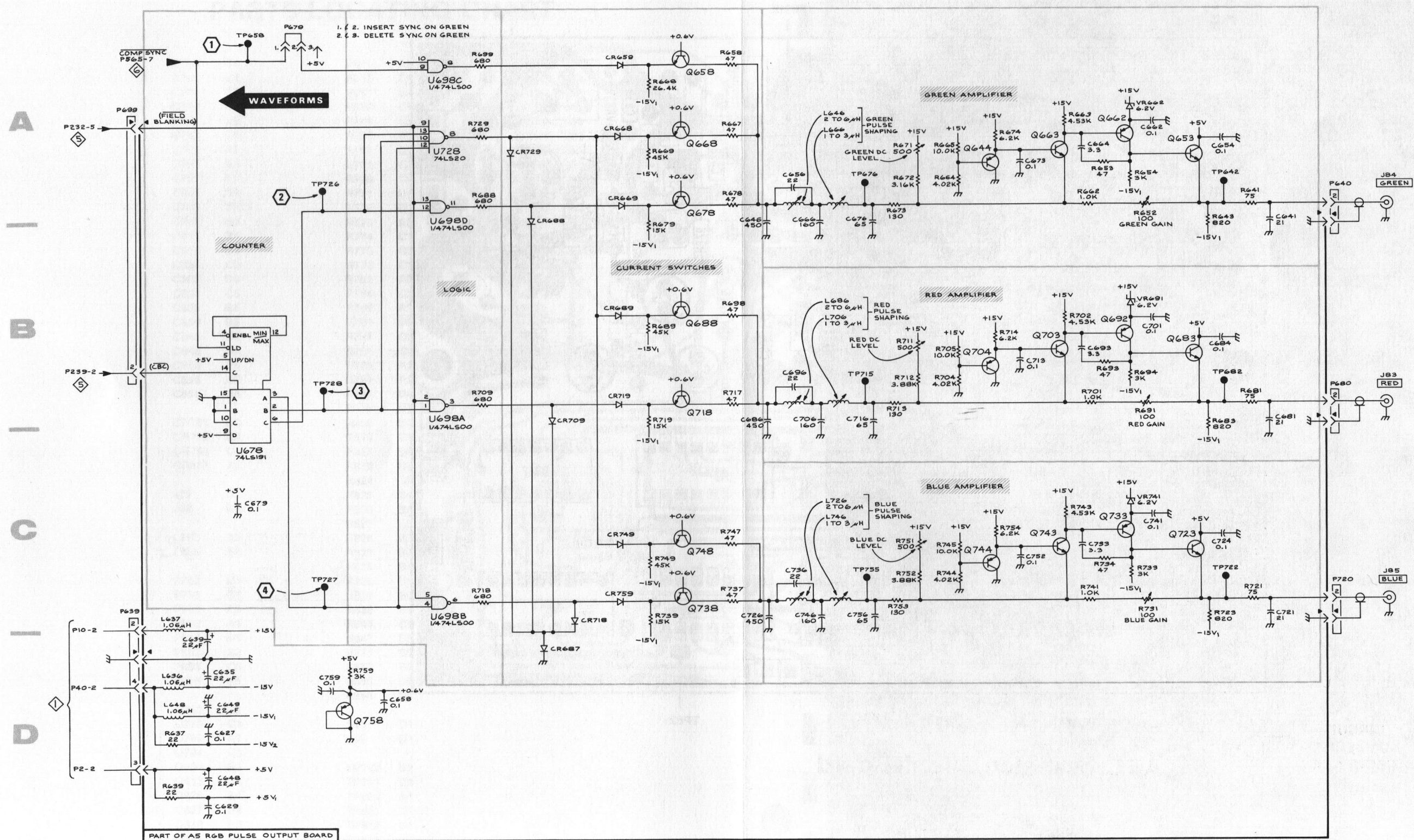
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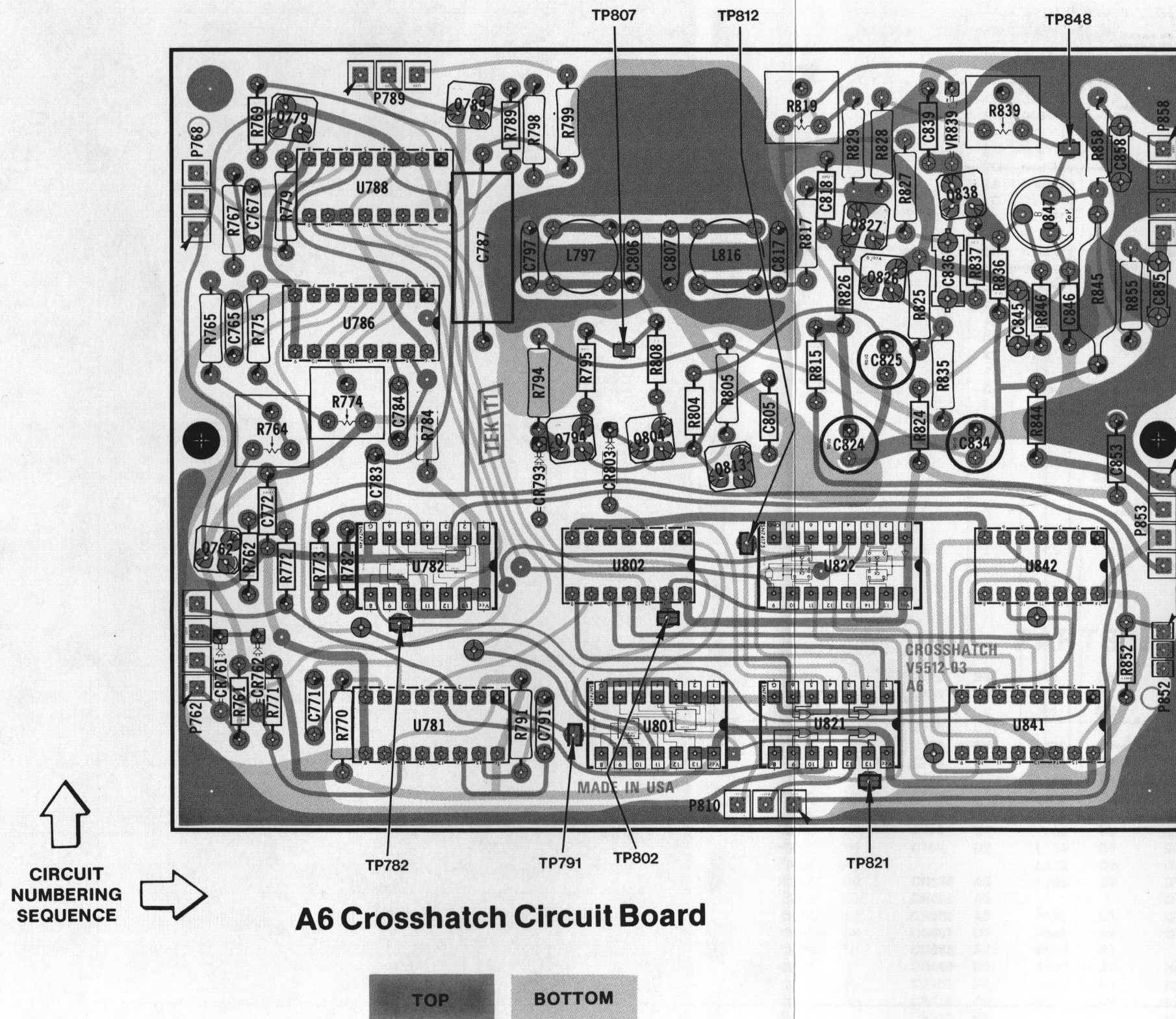
7

RGB

PARTS LOCATING CHART

| | | | | | | | | | | | | | |
|------|----|-------|----|------|----|------|----|------|----|------|----|-------|----|
| C627 | D1 | C716 | B4 | J83 | B5 | Q663 | A4 | R662 | A4 | R705 | B4 | R753 | C4 |
| C629 | D1 | C721 | C5 | J84 | A5 | Q668 | A3 | R663 | A4 | R709 | B2 | R754 | C4 |
| C635 | D1 | C724 | C5 | J85 | C5 | Q678 | A3 | R664 | A4 | R711 | B4 | R759 | D2 |
| C639 | D1 | C726 | C3 | | | Q683 | B5 | R665 | A4 | R712 | B4 | | |
| C641 | A5 | C733 | C4 | L636 | D1 | Q688 | B3 | R667 | A3 | R713 | B4 | TP642 | A5 |
| C646 | A3 | C736 | C3 | L637 | C1 | Q692 | B5 | R668 | A3 | R714 | B4 | TP658 | A1 |
| C648 | D1 | C741 | C5 | L646 | A3 | Q703 | B4 | R669 | A3 | R717 | B3 | TP676 | A4 |
| C649 | D1 | C746 | C3 | L648 | D1 | Q704 | B4 | R671 | A4 | R718 | C2 | TP682 | B5 |
| C654 | A5 | C752 | C4 | L666 | A3 | Q718 | B3 | R672 | A4 | R719 | B3 | TP715 | B4 |
| C656 | A3 | C756 | C4 | L686 | B3 | Q723 | C5 | R673 | A4 | R721 | C5 | TP722 | C5 |
| C658 | D2 | C759 | D2 | L706 | B3 | Q733 | C5 | R674 | A4 | R723 | C5 | TP726 | A2 |
| C662 | A5 | | | L726 | C3 | Q738 | C3 | R678 | A3 | R729 | A2 | TP727 | C2 |
| C664 | A4 | CR659 | A3 | L746 | C3 | Q743 | C4 | R679 | B3 | R731 | C5 | TP728 | B2 |
| C666 | A3 | CR668 | A3 | | | Q744 | C4 | R681 | B5 | R733 | C5 | TP755 | C4 |
| C673 | A4 | CR669 | A3 | P639 | C1 | Q748 | C3 | R683 | B5 | R734 | C4 | | |
| C676 | A4 | CR687 | D2 | P640 | A5 | Q758 | D2 | R688 | A2 | R737 | C3 | U678 | B1 |
| C679 | C1 | CR688 | A2 | P679 | A1 | | | R689 | B3 | R739 | C3 | U698A | B2 |
| C681 | B5 | CR689 | B3 | P680 | B5 | R637 | D1 | R691 | B5 | R741 | C4 | U698B | C2 |
| C684 | B5 | CR709 | B2 | P699 | A1 | R639 | D1 | R693 | B4 | R743 | C4 | U698C | A2 |
| C686 | B3 | CR718 | C2 | P720 | C5 | R641 | A5 | R694 | B5 | R744 | C4 | U698D | A2 |
| C693 | B4 | CR719 | B3 | | | R643 | A5 | R698 | B3 | R745 | C4 | U728 | A2 |
| C696 | B3 | CR729 | A2 | Q644 | A4 | R652 | A5 | R699 | A2 | R747 | C3 | | |
| C701 | B5 | CR749 | C3 | Q653 | A5 | R653 | A4 | R701 | B4 | R749 | C3 | VR662 | A5 |
| C706 | B3 | CR759 | C3 | Q658 | A3 | R654 | A5 | R702 | B4 | R751 | C4 | VR691 | B5 |
| C713 | B4 | | | Q662 | A5 | R658 | A3 | R704 | B4 | R752 | C4 | VR741 | C5 |





A6 Crosshatch Circuit Board

TOP

BOTTOM

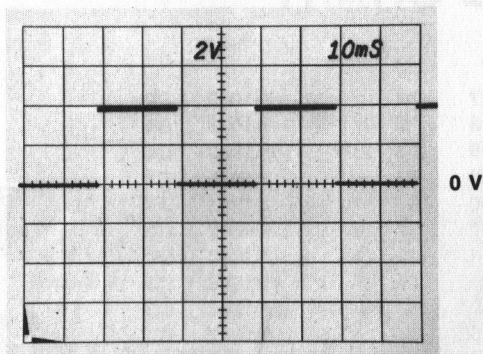
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CONVERGENCE PARTS LOCATING CHART

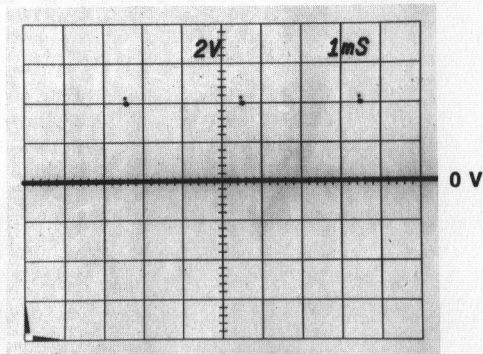
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|-------|----|-------|----|-------|----|
| C765 | C2 | R94 | A1 | U781A | D4 |
| C767 | C2 | R595 | C1 | U781B | C4 |
| C771 | C4 | R761 | D1 | U782A | A2 |
| C772 | C3 | R762 | C2 | U782B | A2 |
| C783 | A2 | R764 | C2 | U786A | D2 |
| C784 | C2 | R765 | C2 | U786B | D2 |
| C787 | A2 | R767 | C1 | U788A | A1 |
| C791 | D4 | R769 | C2 | U788B | D1 |
| C797 | B3 | R770 | C4 | U801A | B2 |
| C805 | D4 | R771 | D1 | U801B | C3 |
| C806 | B3 | R772 | D1 | U802A | B2 |
| C807 | B3 | R773 | A2 | U802C | B4 |
| C817 | B4 | R774 | C2 | U802D | A2 |
| C818 | B4 | R775 | C2 | U821A | B4 |
| C824 | C5 | R779 | C1 | U821B | A4 |
| C825 | D5 | R782 | A2 | U821C | A4 |
| C834 | C5 | R784 | C2 | U821D | C2 |
| C836 | B5 | R789 | A2 | U822 | A3 |
| C839 | B5 | R791 | D4 | U842 | A3 |
| C845 | B5 | R794 | C3 | U841 | A3 |
| C846 | B5 | R795 | C3 | | |
| C853 | D5 | R798 | A1 | VR839 | A5 |
| C855 | B5 | R799 | A1 | | |
| C858 | B5 | R804 | D4 | | |
| | | R805 | B3 | | |
| CR761 | D3 | R808 | B3 | | |
| CR762 | D3 | R815 | C5 | | |
| CR793 | C3 | R817 | B4 | | |
| CR803 | B3 | R819 | B4 | | |
| | | R824 | D5 | | |
| J75 | B5 | R825 | B4 | | |
| J82 | B5 | R826 | B4 | | |
| | | R827 | B5 | | |
| L797 | B3 | R828 | B5 | | |
| L816 | B3 | R829 | B4 | | |
| | | R835 | B4 | | |
| P762 | D1 | R836 | B5 | | |
| P768 | C1 | R837 | B5 | | |
| P789 | A1 | R839 | B5 | | |
| P810 | A1 | R844 | C5 | | |
| P810 | B1 | R845 | B5 | | |
| P852 | B2 | R846 | B5 | | |
| P853 | C5 | R852 | B2 | | |
| P858 | B5 | R855 | B5 | | |
| | | R858 | B5 | | |
| Q762 | C2 | | | | |
| Q779 | C1 | S94 | D1 | | |
| Q789 | A1 | S95 | D1 | | |
| Q794 | C3 | | | | |
| Q804 | B3 | TP782 | B3 | | |
| Q813 | D4 | TP791 | C3 | | |
| Q826 | B4 | TP802 | A4 | | |
| Q827 | B4 | TP807 | B3 | | |
| Q838 | B5 | TP812 | B4 | | |
| Q847 | B5 | TP821 | A4 | | |
| | | TP848 | B5 | | |

WAVEFORMS

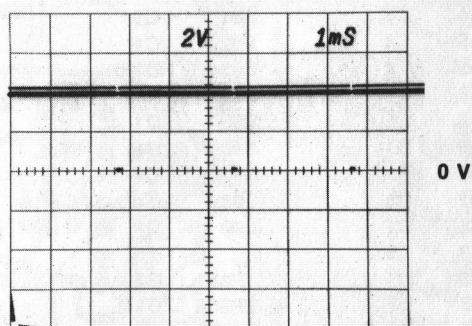
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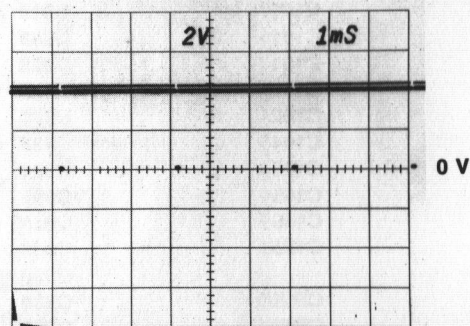
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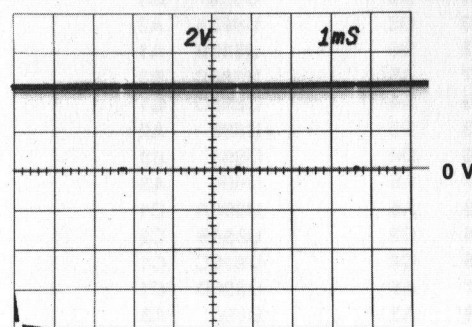
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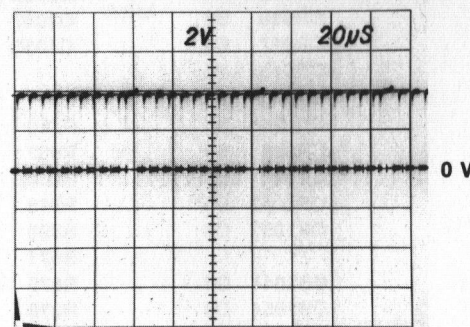
3



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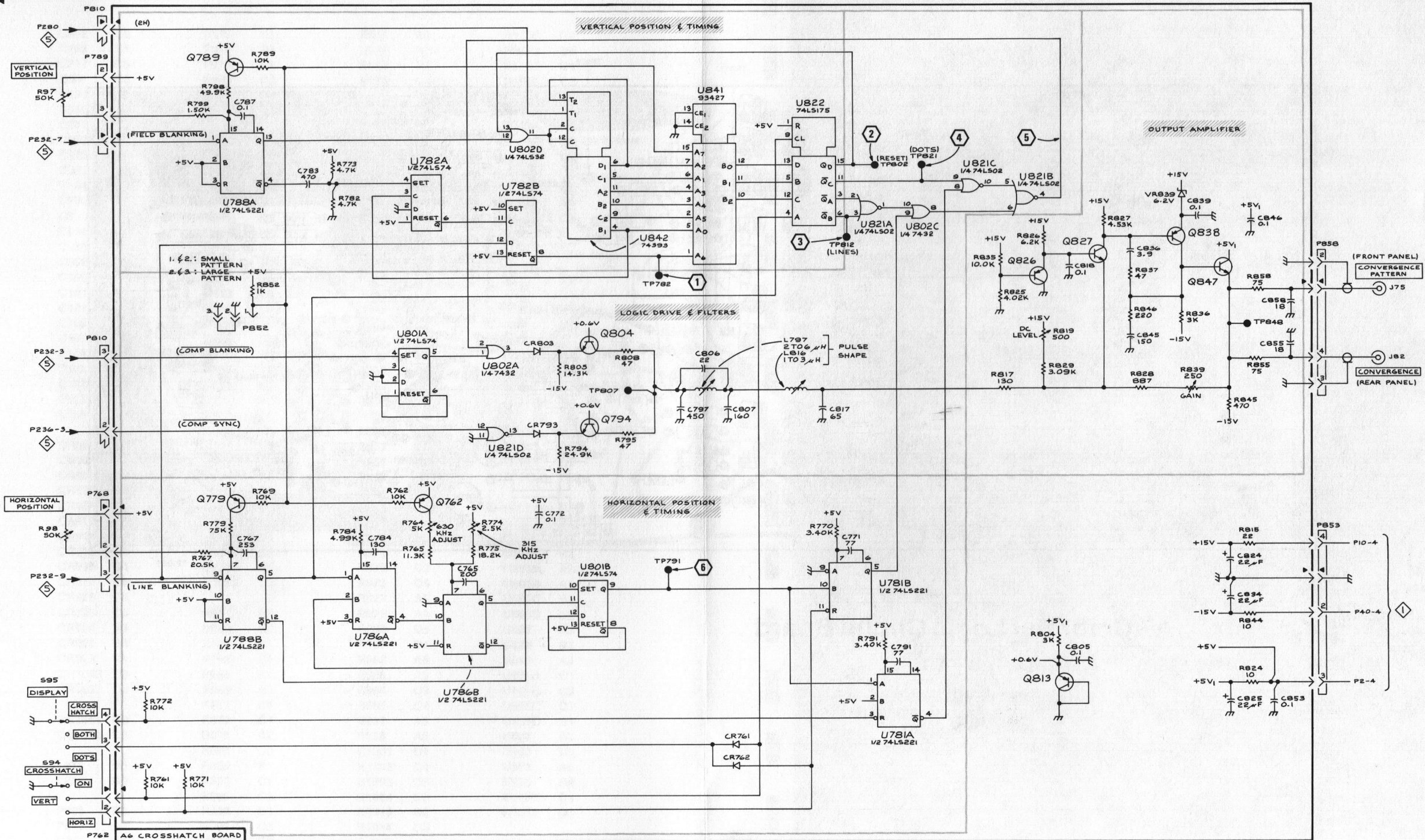
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WAVEFORMS





A7 Color Bar Logic Circuit Board

TOP

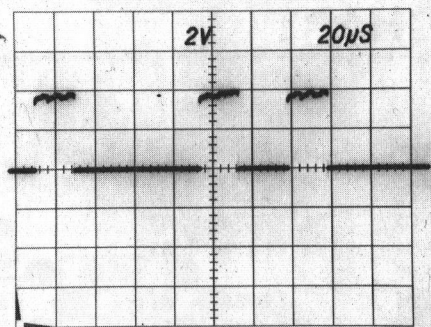
BOTTOM

COLOR BAR LOGIC PARTS LOCATING CHART

| | | | | | | | |
|--------|----|-------|----|-------|----|--------|----|
| C862 | C5 | P910 | B5 | R917 | A3 | R1030 | D2 |
| C865 | B1 | P970 | D5 | R918 | A3 | R1032 | D4 |
| C887 | C5 | P970 | B5 | R919 | A3 | R1033 | D4 |
| C907 | C5 | P970 | D2 | R923 | C4 | R1035 | C3 |
| C953 | B5 | P1019 | C5 | R926 | A3 | R1041 | D3 |
| C955 | D5 | P1019 | A4 | R927 | B3 | R1042 | D3 |
| C973 | D5 | | | R928 | A3 | R1043 | D3 |
| C973 | B5 | Q903 | B4 | R941 | C4 | R1045 | C3 |
| C975 | B5 | Q911 | C4 | R945A | A3 | R1046 | C3 |
| C981 | B5 | Q912 | B4 | R945B | A4 | R1047 | D3 |
| C984 | B5 | Q913 | B4 | R945C | A4 | R1052 | D3 |
| C985 | D4 | Q914 | B3 | R945D | B4 | R1053 | D3 |
| C986 | A5 | Q915 | B4 | R945E | B4 | R1056 | D3 |
| C995 | B5 | Q916 | B4 | R945F | B4 | R1057 | D3 |
| C996 | A5 | Q917 | B3 | R945G | A4 | R1077 | D3 |
| C999 | A5 | Q918 | A4 | R945H | C3 | | |
| C1007 | A5 | Q919 | A3 | R945J | C3 | S81 | C1 |
| C1013 | D3 | Q923 | B4 | R945K | C4 | S82 | C1 |
| C1017 | A5 | Q928 | A4 | R945L | C4 | S83 | D1 |
| C1023 | D3 | Q929 | A4 | R946 | A4 | S84 | D1 |
| C1024 | D4 | Q932 | C5 | R947 | A4 | S85 | D1 |
| C1045 | C3 | Q933 | C5 | R948 | D4 | S86 | B1 |
| C1053 | D3 | Q934 | A4 | R950 | B5 | S87 | C1 |
| C1054 | D3 | Q935 | B4 | R951 | B5 | S88 | A4 |
| C1055 | B5 | Q936 | B4 | R952 | C5 | S90 | D1 |
| C1056 | B5 | Q937 | B4 | R953 | C5 | | |
| | | Q938 | A4 | R955 | D5 | TP881 | D2 |
| CR900 | C4 | Q939 | A3 | R957 | D4 | TP945 | D5 |
| CR901 | C4 | Q947 | D4 | R958 | B4 | TP978 | A5 |
| CR902 | C4 | Q948 | B4 | R963 | D5 | TP1053 | D3 |
| CR903 | C3 | Q954 | D5 | R964 | D5 | | |
| CR904 | C3 | Q1003 | D3 | R966 | D4 | U864B | B2 |
| CR913 | C4 | Q1012 | D4 | R967 | D4 | U868 | A2 |
| CR914 | C3 | Q1015 | D4 | R970 | D5 | U882 | C2 |
| CR915 | B4 | Q1032 | D3 | R971 | D5 | U884 | B3 |
| CR916 | B4 | Q1047 | D3 | R972 | D5 | U886A | A2 |
| CR917 | B4 | Q1053 | D3 | R973 | D5 | U886B | A1 |
| CR919 | B4 | | | R977 | A5 | U886C | B2 |
| CR923 | C3 | R81 | D5 | R979 | A4 | U886D | B1 |
| CR924 | B3 | R860 | C1 | R983 | D5 | U888 | A2 |
| CR925 | B4 | R861 | C1 | R986 | D4 | U894 | B3 |
| CR928 | B4 | R862 | C1 | R987 | A5 | U896 | A3 |
| CR1043 | D3 | R865 | B1 | R988 | A5 | U896A | C1 |
| CR1057 | D3 | R866 | A2 | R994 | D3 | U896B | C2 |
| | | R871 | C1 | R995 | C4 | U896C | C1 |
| DS1044 | D3 | R872 | C1 | R997 | A5 | U896D | C1 |
| DS1054 | D3 | R876 | B2 | R998 | A5 | U898 | A3 |
| | | R881 | C2 | R1001 | D2 | U963 | D5 |
| L971 | B5 | R889 | B1 | R1002 | D4 | U978 | A5 |
| L972 | B5 | R891 | C1 | R1003 | D3 | U985 | D4 |
| | | R893 | C3 | R1004 | C3 | U1034 | C4 |
| P866 | B2 | R893 | B1 | R1010 | D2 | U1055 | D3 |
| P876 | B2 | R901 | C3 | R1014 | D3 | | |
| P879 | A1 | R903 | C3 | R1015 | C4 | | |
| P879 | B1 | R904 | B3 | R1015 | C5 | | |
| P880 | C1 | R911 | C4 | R1021 | D4 | | |
| P880 | D2 | R912 | C4 | R1022 | D4 | | |
| P880 | D1 | R913 | B5 | R1023 | D4 | | |
| P890 | C5 | R915 | B3 | R1024 | D4 | | |
| P890 | B1 | R916 | B3 | R1025 | D3 | | |

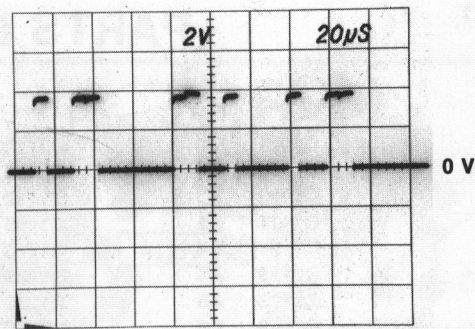
WAVEFORMS

9



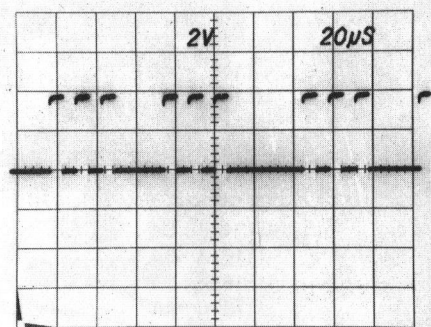
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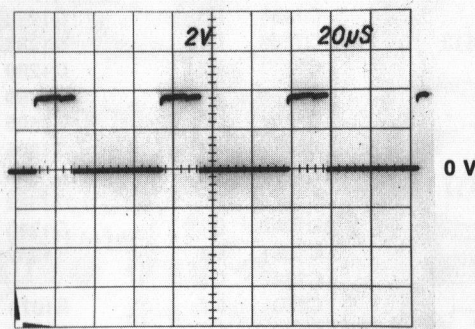
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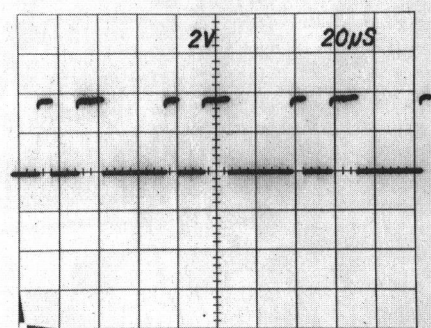
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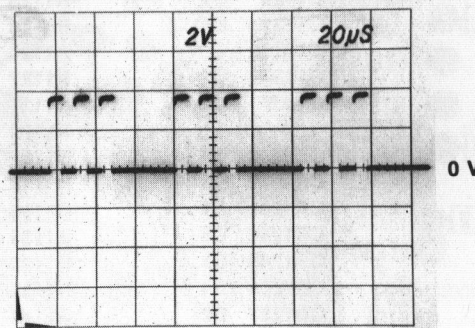
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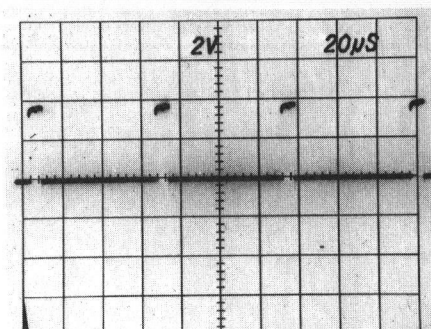
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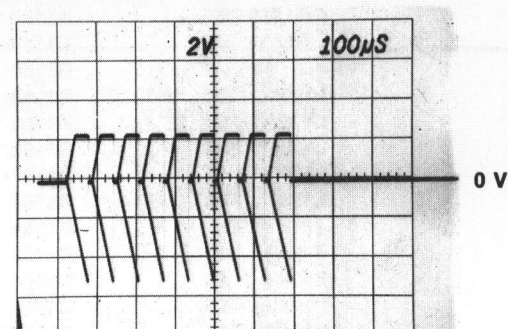
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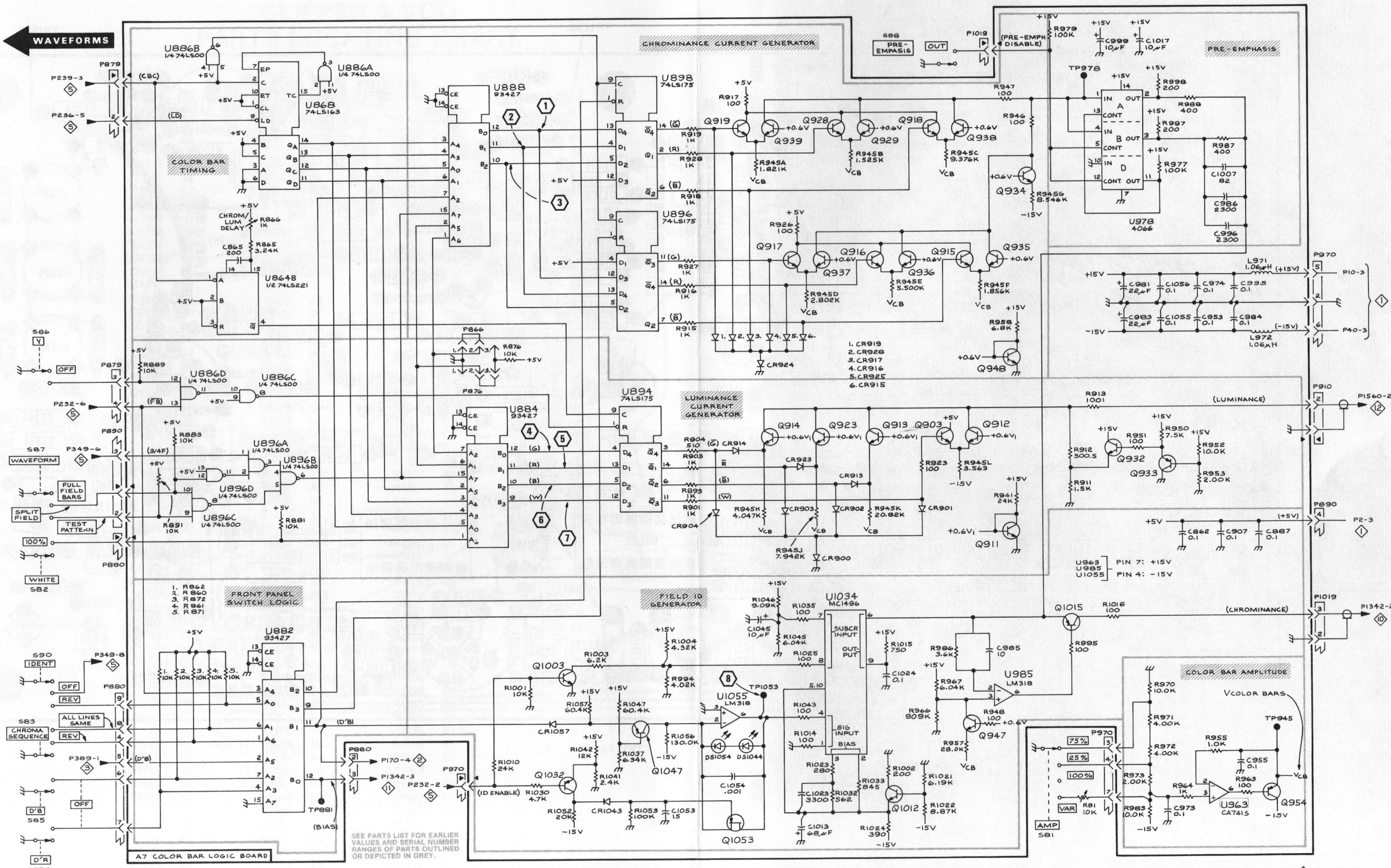
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8

7.8 kHz TRIGGER

WAVEFORMS

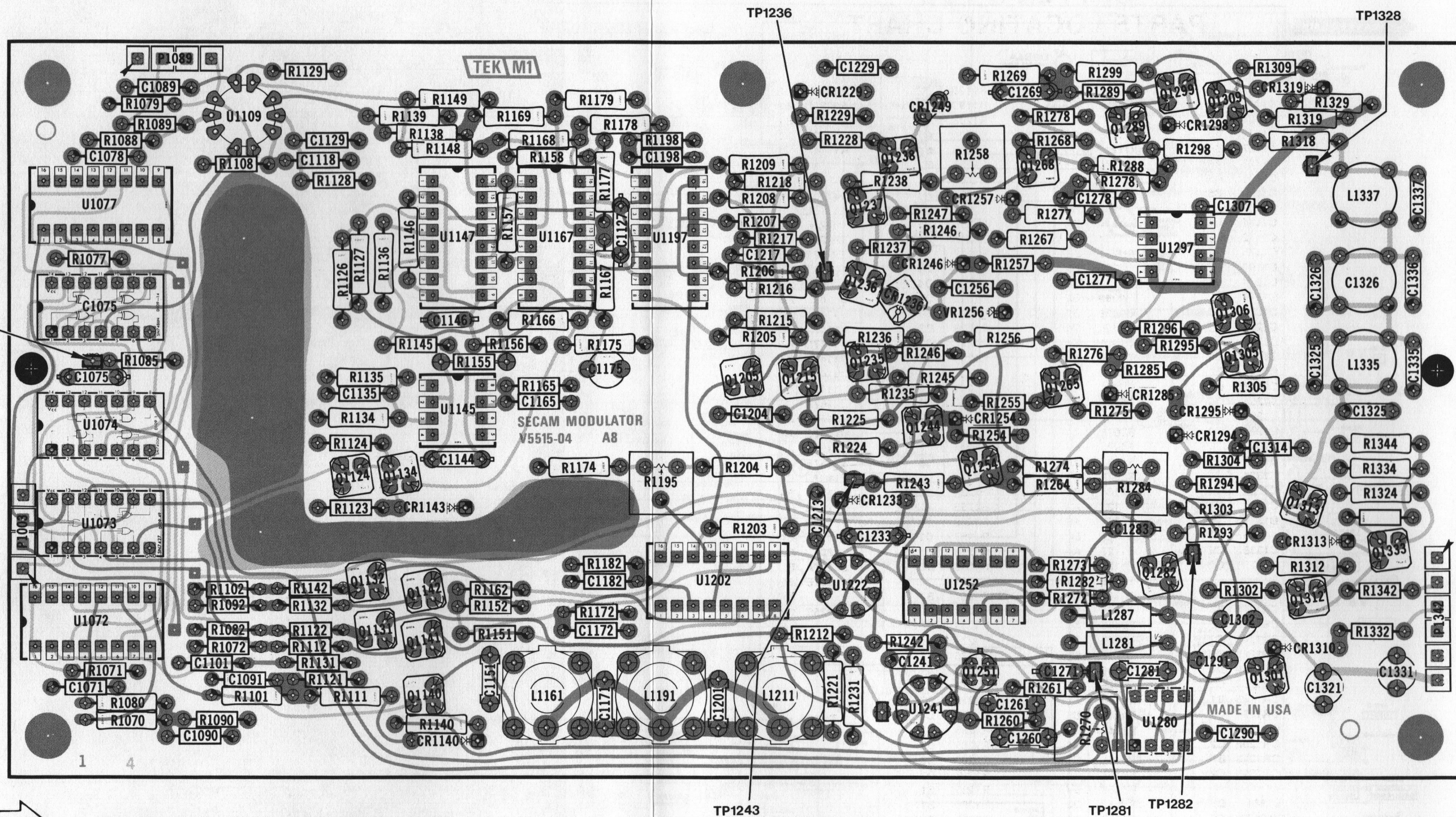


CIRCUIT
NUMBERING
SEQUENCE

A8 Modulator Circuit Board

TOP

BOTTOM



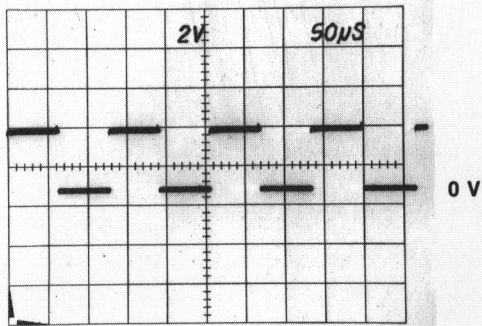


CLIPPER & VCO PARTS LOCATING CHART

| | | | | | | | |
|--------|----|-------|----|-------|----|--------|----|
| C1071 | C5 | Q1124 | A3 | R1195 | D2 | R1329 | C2 |
| C1078 | C5 | Q1134 | A3 | R1198 | D5 | R1333 | B1 |
| C1089 | A5 | Q1142 | D2 | R1203 | C2 | R1334 | B1 |
| C1118 | A5 | Q1205 | D4 | R1204 | C2 | R1342 | B1 |
| C1127 | B4 | Q1215 | D4 | R1205 | C4 | R1344 | B1 |
| C1129 | A5 | Q1235 | D3 | R1206 | D2 | | |
| C1135 | A5 | Q1236 | C3 | R1207 | B4 | S93A | A1 |
| C1146 | C5 | Q1237 | C3 | R1208 | C4 | S93B | A1 |
| C1149 | A4 | Q1238 | B3 | R1209 | C4 | | |
| C1165 | A4 | Q1244 | D4 | R1215 | C3 | TP1236 | C3 |
| C1172 | D5 | Q1354 | D4 | R1216 | D2 | TP1282 | D2 |
| C1175 | A4 | Q1265 | A1 | R1217 | D2 | TP1328 | B2 |
| C1198 | D5 | Q1268 | B2 | R1218 | C4 | | |
| C1204 | D3 | Q1282 | C2 | R1224 | D4 | U1076B | A5 |
| C1217 | D2 | Q1289 | B2 | R1225 | D4 | U1109 | A5 |
| C1229 | D5 | Q1299 | B2 | R1228 | B3 | U1145 | A4 |
| C1256 | C3 | Q1305 | B1 | R1229 | B3 | U1147A | B3 |
| C1269 | B3 | Q1306 | B1 | R1235 | D3 | U1147B | B4 |
| C1277 | D5 | Q1309 | C2 | R1236 | D3 | U1147C | A4 |
| C1278 | B2 | Q1312 | C1 | R1237 | C3 | U1147D | B4 |
| C1283 | D2 | Q1313 | C2 | R1238 | C3 | U1147E | B4 |
| C1291 | D5 | Q1342 | B1 | R1243 | C4 | U1167A | B4 |
| C1302 | C5 | | | R1244 | C2 | U1167B | B4 |
| C1304 | C2 | R1079 | A4 | R1245 | D3 | U1167C | A4 |
| C1307 | C5 | R1088 | A5 | R1246 | B3 | U1167D | A4 |
| C1314 | C5 | R1089 | A5 | R1246 | D3 | U1167E | B4 |
| C1321 | C5 | R1092 | D1 | R1247 | C3 | U1197A | C4 |
| C1325 | C2 | R1108 | A5 | R1254 | D4 | U1197B | B4 |
| C1326 | C2 | R1123 | A3 | R1255 | A1 | U1197C | B4 |
| C1331 | D5 | R1124 | A3 | R1256 | D4 | U1197D | D2 |
| C1335 | C2 | R1126 | B4 | R1257 | C3 | U1197E | C4 |
| C1336 | C2 | R1127 | A4 | R1258 | C3 | U1202C | C2 |
| C1337 | C2 | R1128 | A5 | R1259 | B2 | U1297A | B2 |
| | | R1129 | A5 | R1264 | C3 | U1297B | B2 |
| CR1143 | A3 | R1132 | D2 | R1267 | B2 | | |
| CR1229 | B3 | R1134 | A4 | R1268 | B2 | VR1256 | C3 |
| CR1236 | C3 | R1135 | A4 | R1269 | B2 | | |
| CR1246 | C3 | R1136 | B4 | R1274 | C4 | | |
| CR1249 | B3 | R1138 | B3 | R1275 | A1 | | |
| CR1254 | D4 | R1139 | B3 | R1276 | A1 | | |
| CR1257 | C2 | R1145 | A4 | R1277 | C2 | | |
| CR1285 | B1 | R1146 | A4 | R1278 | B2 | | |
| CR1294 | C1 | R1148 | B5 | R1284 | C4 | | |
| CR1295 | B1 | R1149 | B5 | R1285 | A1 | | |
| CR1298 | C2 | R1155 | A4 | R1288 | B2 | | |
| CR1313 | B1 | R1156 | C5 | R1289 | B2 | | |
| CR1319 | C2 | R1157 | B4 | R1293 | D2 | | |
| | | R1158 | B4 | R1295 | B1 | | |
| L1281 | D5 | R1162 | D2 | R1296 | B1 | | |
| L1287 | C5 | R1165 | A4 | R1298 | B2 | | |
| L1335 | B2 | R1166 | A4 | R1299 | C2 | | |
| L1336 | B2 | R1167 | B3 | R1302 | C1 | | |
| L1337 | B2 | R1168 | B4 | R1303 | D2 | | |
| | | R1169 | B3 | R1304 | C1 | | |
| P1089 | A1 | R1172 | D5 | R1305 | B1 | | |
| P1089 | A5 | R1174 | D2 | R1309 | C2 | | |
| P1089 | C5 | R1175 | A3 | R1312 | C1 | | |
| P1342 | B1 | R1177 | B4 | R1318 | B2 | | |
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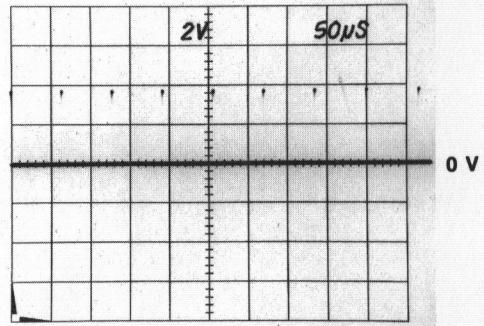
WAVEFORMS

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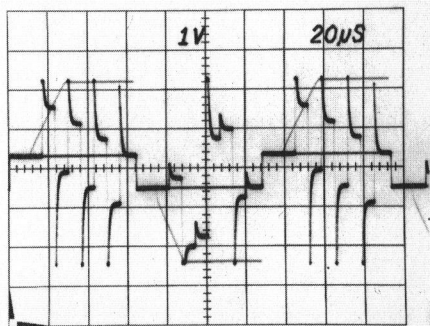
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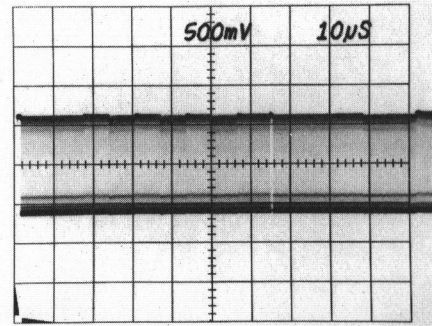
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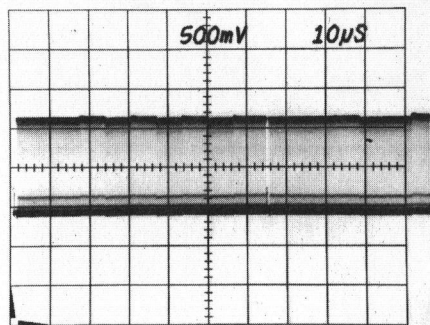
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AC COUPLED



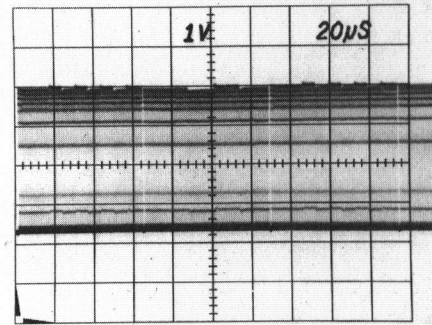
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7.8 kHz TRIGGER
AC COUPLED



5

7.8 kHz TRIGGER
AC COUPLED

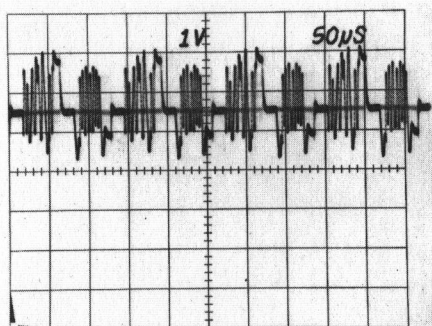


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AC COUPLED

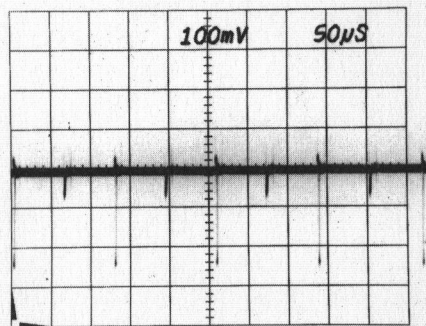
WAVEFORMS

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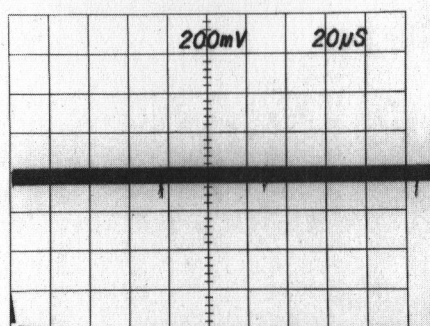


1

7.8 kHz TRIGGER



2

7.8 kHz TRIGGER
AC COUPLED

3

7.8 kHz TRIGGER
AC COUPLED

11

C1075 A2
C1090 B3
C1091 A3
C1101 A3
C1151 A4
C1171 A4
C1182 C3
C1201 A4
C1213 C4
C1233 C4
C1241 A5
C1260 B2
C1261 B4
C1271 C3
C1281 B5
C1290 B5

CR1140 B3
CR1233 C4
CR1310 D4

L1161 A4
L1191 A4
L1211 A4
L1221 A4
P1062 A1
P1342 D1

Q1124 B2
Q1131 B4
Q1132 C3
Q1140 A3
Q1141 C3

Q1251 A4
Q1301 D4

R1070 B3
R1071 A3
R1072 C3
R1077 A2
R1080 B3
R1082 B4
R1085 A2
R1090 B3
R1101 A3
R1102 C3
R1111 A3
R1112 C3
R1121 A3

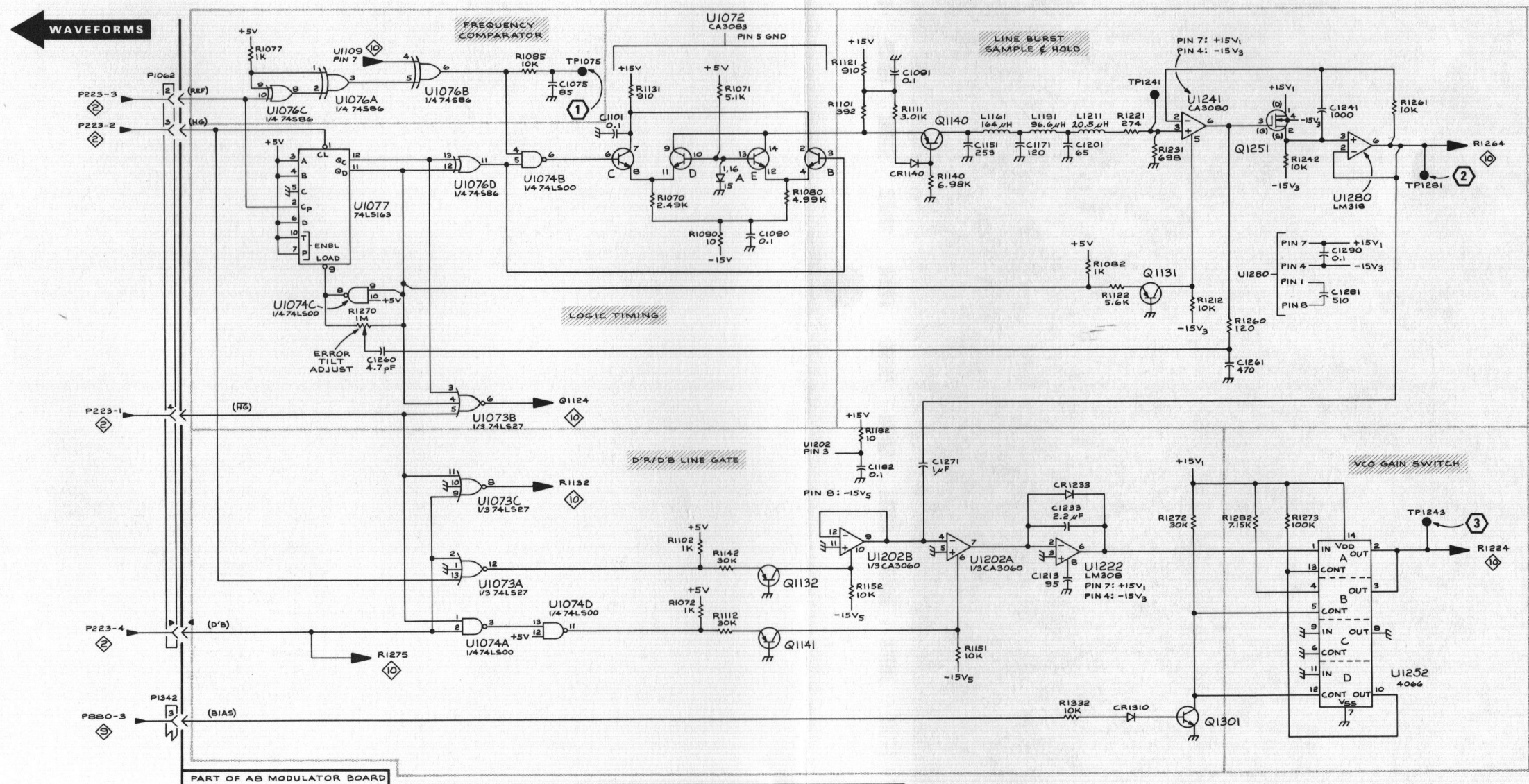
R1122 B4
R1131 A3
R1132 C2
R1140 B3
R1142 C3
R1151 C4
R1152 C3
R1182 C3
R1212 B4
R1231 B4
R1242 B5
R1260 B4
R1261 A5
R1270 B2
R1272 C4
R1273 C5

R1275 C2
R1282 C4
R1332 D4

TP1075 A2
TP1241 A4
TP1243 C5
TP1281 B5

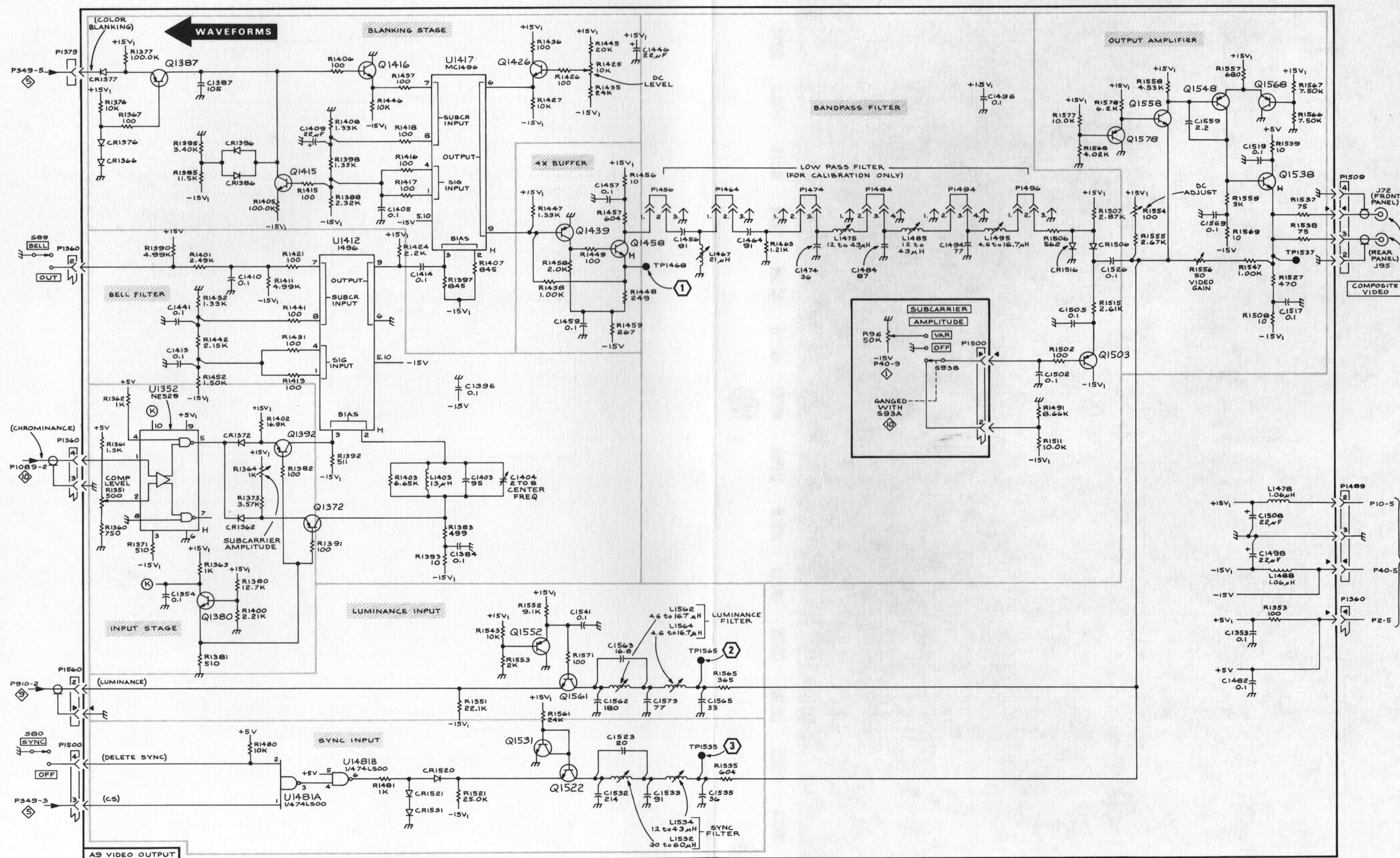
U1072 A3
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U1073B C2
U1073C C2
U1074 B2
U1074A C2
U1074B B2

U1074C B2
U1074D C2
U1076A A2
U1076B A2
U1076C A2
U1076D B2
U1077 B2
U1109 A2
U1202 C3
U1202A C4
U1202B C3
U1222 C4
U1241 A4
U1252 D5
U1280 B4
U1280 B5



VIDEO OUTPUT PARTS LOCATING CHART

| | | | | | | | |
|-------|----|-------|----|-------|----|--------|----|
| P1360 | C5 | R1360 | C1 | R1425 | A3 | R1543 | C2 |
| P1360 | B1 | R1361 | B1 | R1426 | A3 | R1547 | B5 |
| P1379 | A1 | R1362 | B1 | R1427 | A2 | R1551 | D2 |
| P1456 | A3 | R1363 | C1 | R1427 | B2 | R1552 | C2 |
| P1464 | A3 | R1364 | C1 | R1431 | B2 | R1553 | D2 |
| P1474 | A3 | R1367 | A1 | R1432 | B1 | R1554 | A5 |
| P1484 | A4 | R1371 | C1 | R1435 | A3 | R1555 | A5 |
| P1489 | C5 | R1373 | C1 | R1436 | A2 | R1556 | B5 |
| P1494 | A4 | R1376 | A1 | R1437 | A2 | R1557 | A5 |
| P1496 | A4 | R1377 | A1 | R1438 | B3 | R1558 | A5 |
| P1500 | D1 | R1381 | C1 | R1441 | B2 | R1559 | A5 |
| P1500 | B4 | R1382 | C2 | R1442 | B1 | R1561 | D2 |
| P1509 | A5 | R1383 | C2 | R1445 | A3 | R1565 | D3 |
| P1560 | D1 | R1385 | A1 | R1446 | A2 | R1566 | A5 |
| | | R1388 | A2 | R1447 | A2 | R1567 | A5 |
| Q1372 | C2 | R1390 | B1 | R1448 | B3 | R1568 | A4 |
| Q1380 | C1 | R1391 | C1 | R1449 | B3 | R1569 | A5 |
| Q1387 | A1 | R1391 | C2 | R1452 | B1 | R1571 | C3 |
| Q1392 | B2 | R1392 | C2 | R1456 | A3 | R1577 | A4 |
| Q1415 | A2 | R1393 | C2 | R1457 | A3 | R1578 | A5 |
| Q1416 | A2 | R1395 | A1 | R1458 | B3 | | |
| Q1426 | A2 | R1397 | B2 | R1459 | B3 | S80 | D1 |
| Q1439 | A3 | R1398 | A2 | R1463 | B3 | S89 | B1 |
| Q1458 | B3 | R1400 | C1 | R1480 | D1 | S93B | B4 |
| Q1503 | B5 | R1401 | B1 | R1481 | D2 | | |
| Q1522 | D3 | R1402 | B1 | R1491 | B4 | TP35 | D3 |
| Q1531 | D2 | R1403 | C2 | R1502 | B4 | TP37 | B5 |
| Q1538 | A5 | R1405 | A1 | R1506 | A4 | TP65 | C3 |
| Q1548 | A5 | R1406 | A2 | R1507 | A4 | TP68 | B3 |
| Q1552 | C2 | R1407 | B2 | R1508 | B5 | | |
| Q1558 | A5 | R1408 | A2 | R1511 | B4 | U1352 | B1 |
| Q1561 | D3 | R1411 | B2 | R1515 | B4 | U1412 | A2 |
| Q1568 | A5 | R1413 | B2 | R1521 | D2 | U1417 | A2 |
| Q1578 | A5 | R1415 | A2 | R1527 | B5 | U1481A | D2 |
| | | R1416 | A2 | R1535 | D3 | U1481B | D2 |
| R93 | B4 | R1417 | A2 | R1537 | A5 | | |
| R1351 | C1 | R1418 | A2 | R1538 | A5 | | |
| R1353 | C5 | R1421 | B2 | R1539 | A5 | | |



REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

| 1 | 2 | 3 | 4 | 5 | Name & Description |
|---|---|---|---|---|--|
| | | | | | <i>Assembly and/or Component</i> |
| | | | | | <i>Attaching parts for Assembly and/or Component</i> |
| | | | | | **** END ATTACHING PARTS **** |
| | | | | | <i>Detail Part of Assembly and/or Component</i> |
| | | | | | <i>Attaching parts for Detail Part</i> |
| | | | | | **** END ATTACHING PARTS **** |
| | | | | | <i>Parts of Detail Part</i> |
| | | | | | <i>Attaching parts for Parts of Detail Part</i> |
| | | | | | **** END ATTACHING PARTS **** |

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation.

Attaching parts must be purchased separately, unless otherwise specified.

ABBREVIATIONS

| | | | | | | |
|------------------------|---------|-----------------------|----------|----------------------|---------|-----------------|
| INCH | ELCTRN | ELECTRON | IN | INCH | SE | SINGLE END |
| * NUMBER SIZE | ELEC | ELECTRICAL | INCAND | INCANDESCENT | SECT | SECTION |
| ACTR ACTUATOR | ELCTLT | ELECTROLYTIC | INSUL | INSULATOR | SEMICON | SEMICONDUCTOR |
| ADPTR ADAPTER | ELEM | ELEMENT | INTL | INTERNAL | SHLD | SHIELD |
| ALIGN ALIGNMENT | EPL | ELECTRICAL PARTS LIST | LPHLDR | LAMPHOLDER | SHLDR | SHOULDERED |
| AL ALUMINUM | EQPT | EQUIPMENT | MACH | MACHINE | SKT | SOCKET |
| ASSEM ASSEMBLED | EXT | EXTERNAL | MECH | MECHANICAL | SL | SLIDE |
| ASSY ASSEMBLY | FIL | FILLISTER HEAD | MTG | MOUNTING | SLFLKG | SELF-LOCKING |
| ATTEN ATTENUATOR | FLEX | FLEXIBLE | NIP | NIPPLE | SLVG | SLEEVING |
| AWG AMERICAN WIRE GAGE | FLH | FLAT HEAD | NON WIRE | NOT WIRE WOUND | SPR | SPRING |
| BD BOARD | FLTR | FILTER | OB | ORDER BY DESCRIPTION | SQ | SQUARE |
| BRKT BRACKET | FR | FRAME or FRONT | OD | OUTSIDE DIAMETER | SST | STAINLESS STEEL |
| BRS BRASS | FSTNR | FASTENER | OVH | OVAL HEAD | STL | STEEL |
| BRZ BRONZE | FT | FOOT | PH BRZ | PHOSPHOR BRONZE | SW | SWITCH |
| BSHG BUSHING | FXD | FIXED | PL | PLAIN or PLATE | T | TUBE |
| CAB CABINET | GSKT | GASKET | PLSTC | PLASTIC | TERM | TERMINAL |
| CAP CAPACITOR | HDL | HANDLE | PN | PART NUMBER | THD | THREAD |
| CER CERAMIC | HEX | HEXAGON | PNH | PAN HEAD | THK | THICK |
| CHAS CHASSIS | HEX HD | HEXAGONAL HEAD | PWR | POWER | TNSN | TENSION |
| CKT CIRCUIT | HEX SOC | HEXAGONAL SOCKET | RCPT | RECEPTACLE | TPG | TAPPING |
| COMP COMPOSITION | HLCP | HELICAL COMPRESSION | RES | RESISTOR | TRH | TRUSS HEAD |
| CONN CONNECTOR | HLEXT | HELICAL EXTENSION | RGD | RIGID | V | VOLTAGE |
| COV COVER | HV | HIGH VOLTAGE | RLF | RELIEF | VAR | VARIABLE |
| CPLG COUPLING | IC | INTEGRATED CIRCUIT | RTNR | RETAINER | W/ | WITH |
| CRT CATHODE RAY TUBE | ID | INSIDE DIAMETER | SCH | SOCKET HEAD | WSHR | WASHER |
| DEG DEGREE | IDNT | IDENTIFICATION | SCOPE | OSCILLOSCOPE | XFMR | TRANSFORMER |
| DWR DRAWER | IMPLR | IMPELLER | SCR | SCREW | XSTR | TRANSISTOR |

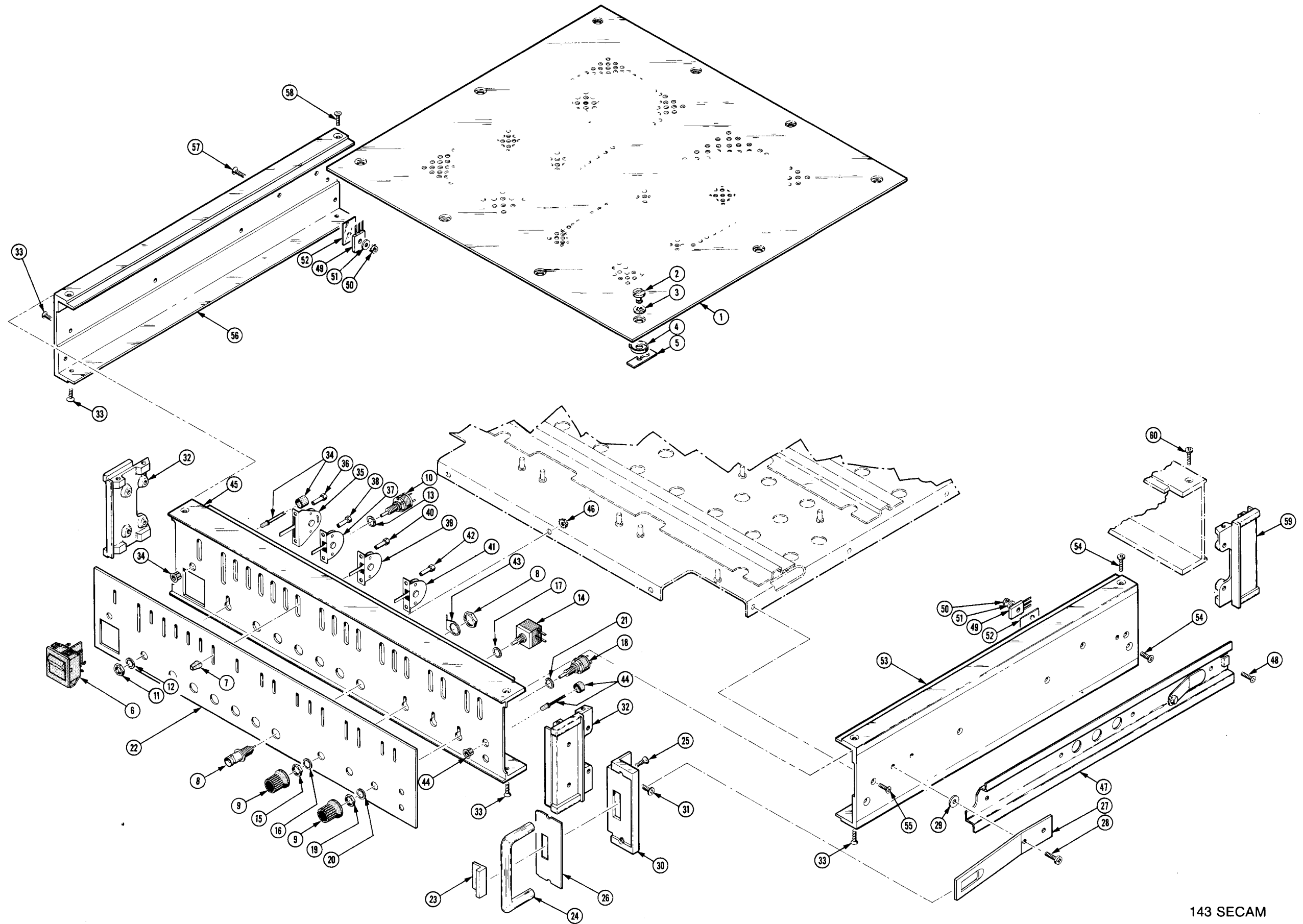
CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

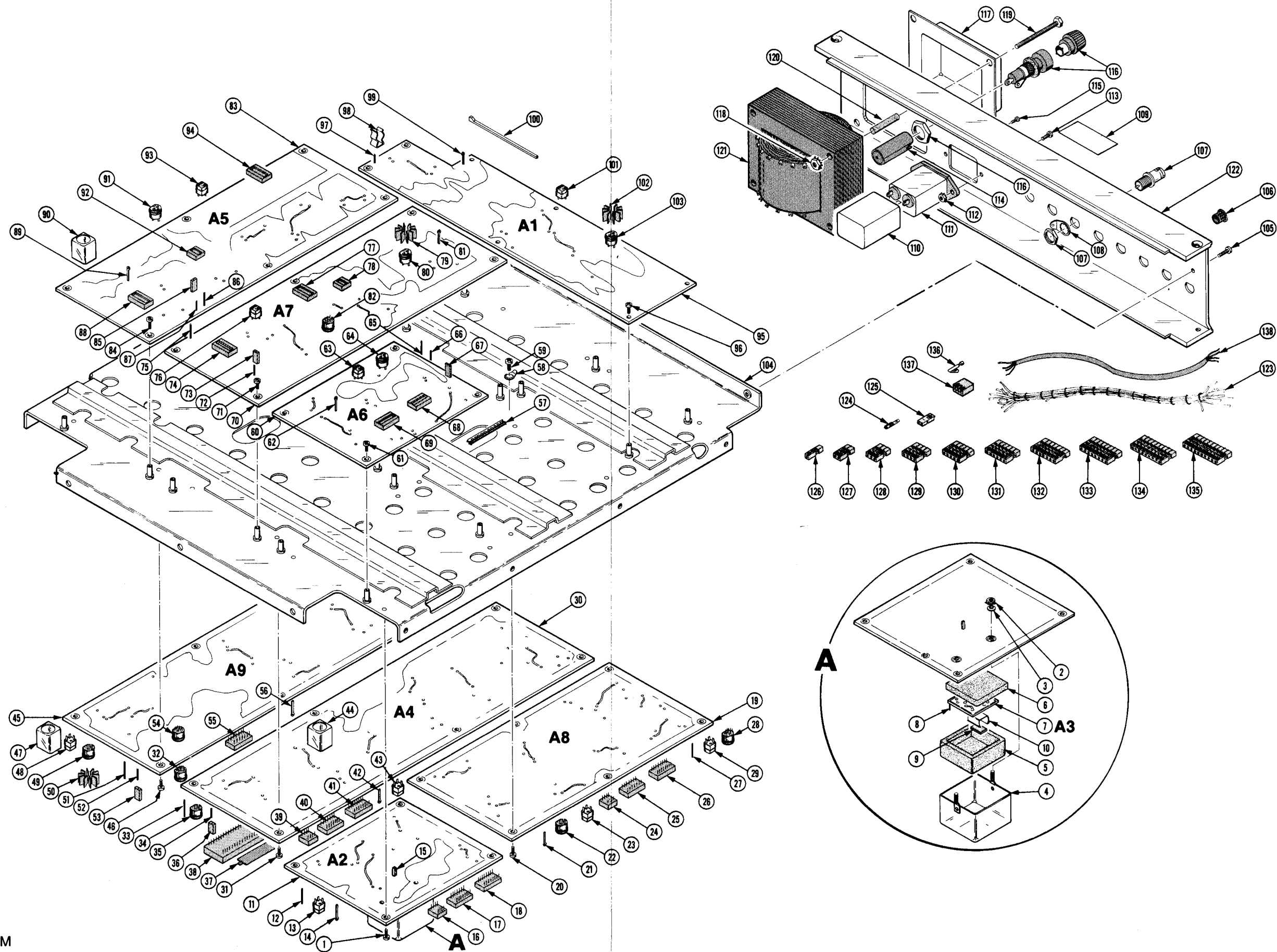
| Mfr. Code | Manufacturer | Address | City, State, Zip |
|-----------|---|---|-----------------------------|
| 000BU | ROSNY-SOUS-BOIS | 101 RUE PHILIBERT HOFFMAN ZONE IND OUEST | F.99116 PARIS, FRANCE |
| 000CY | NORTHWEST FASTENER SALES, INC. | 7923 SW CIRRU DRIVE | BEAVERTON, OR 97005 |
| 00779 | AMP, INC. | P O BOX 3608 | HARRISBURG, PA 17105 |
| 04963 | MINNESOTA MINING AND MFG. CO., ADHESIVES COATINGS AND SEALERS DIVISION | 3M CENTER AUDUBON ROAD | ST. PAUL, MN 55101 |
| 05820 | WAKEFIELD ENGINEERING, INC. | 17301 RIDGELAND | WAKEFIELD, MA 01880 |
| 06383 | PANDUIT CORPORATION | 525 S. WEBSTER AVE. | TINLEY PARK, IL 60477 |
| 06666 | GENERAL DEVICES CO., INC. | P O BOX 867, 1757 STANFORD ST. | INDIANAPOLIS, IN 46219 |
| 11897 | PLASTIGLIDE MFG. CORPORATION | 2021 W VALLEY VIEW LANE | SANTA MONICA, CA 90406 |
| 13103 | THERMALLOY COMPANY, INC. | P O BOX 34829 | DALLAS, TX 75234 |
| 13511 | AMPHENOL CARDRE DIV., BUNKER RAMO CORP. | P. O. BOX 1331 | LOS GATOS, CA 95030 |
| 16428 | BELDEN CORP. | YOUK EXPRESSWAY | RICHMOND, IN 47374 |
| 22526 | BERG ELECTRONICS, INC. | 5224 KATRINE AVE. | NEW CUMBERLAND, PA 17070 |
| 27264 | MOLEX PRODUCTS CO. | 147 N. MICHIGAN AVE. | DOWNERS GROVE, IL 60515 |
| 28520 | HEYMAN MFG. CO. | 2000 S BATAVIA AVENUE | KENILWORTH, NJ 07033 |
| 70903 | BELDEN CORP. | 1501 MORSE AVENUE | GENEVA, IL 60134 |
| 71785 | TRW, CINCH CONNECTORS | 446 MORGAN ST. | ELK GROVE VILLAGE, IL 60007 |
| 73743 | FISCHER SPECIAL MFG. CO. | | CINCINNATI, OH 45206 |
| 73803 | TEXAS INSTRUMENTS, INC., METALLURGICAL MATERIALS DIV. | 34 FOREST STREET | ATTLEBORO, MA 02703 |
| 75915 | LITTELFUSE, INC. | 800 E. NORTHWEST HWY | DES PLAINES, IL 60016 |
| 77250 | PHEOLL MANUFACTURING CO., DIVISION OF ALLIED PRODUCTS CORP. | 5700 W. ROOSEVELT RD. | CHICAGO, IL 60650 |
| 78189 | ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION | ST. CHARLES ROAD | ELGIN, IL 60120 |
| 79807 | WROUGHT WASHER MFG. CO. | 2100 S. O BAY ST. | MILWAUKEE, WI 53207 |
| 80009 | TEKTRONIX, INC. | P O BOX 500 | BEAVERTON, OR 97077 |
| 80126 | PACIFIC ELECTRICORD CO. | 747 W. REDONDO BEACH, P O BOX 10 | GARDENA, CA 90247 |
| 83385 | CENTRAL SCREW CO. | 2530 CRESCENT DR. | BROADVIEW, IL 60153 |
| 86928 | SEASTROM MFG. COMPANY, INC. | 701 SONORA AVENUE | GLENDALE, CA 91201 |
| S3109 | C/O PANEL COMPONENTS CORP. | P.O. BOX 6626 | SANTA ROSA, CA 95406 |

| Fig. & Index No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Qty | 1 2 3 4 5 | Name & Description | Mfr Code | Mfr Part Number |
|------------------------|-----------------------|--------------------------------|-----|-----------|---|-------------|------------------|
| 1-1 | 390-0562-00 | | 2 | | CAB. REAR, DSPL: TOP AND BOTTOM | 80009 | 390-0562-00 |
| | ----- | | - | | EACH COVER INCLUDES: | | |
| | 214-0603-02 | | 10 | | .PIN ASSY, SECRG: | 80009 | 214-0603-02 |
| -2 | 214-0603-01 | | 10 | | ..PIN, SECURING: 0.27 INCH LONG | 80009 | 214-0603-01 |
| -3 | 214-0604-00 | | 10 | | ..WASH., SPG TNSN: 0.26 ID X 0.47 INCH OD | 80009 | 214-0604-00 |
| -4 | 386-0227-01 | | 10 | | .STOP, CLP, RIM CL: BLACK ACETAL | 80009 | 386-0227-01 |
| -5 | 386-1151-00 | | 10 | | .CLAMP, RIM CLENC: SPG STL CD PL | 80009 | 386-1151-00 |
| -6 | ----- | | 1 | | SWITCH TOGGLE: (SEE EPL S98) | | |
| -7 | 366-0215-02 | | 18 | | KNOB: LEVER SWITCH | 80009 | 366-0215-02 |
| -8 | 131-0955-00 | | 6 | | CONN, RCPT, ELEC: BNC, FEMALE | 13511 | 31-279 |
| | 131-2001-00 | | 6 | | CONN, RCPT, ELEC: MINQUICK, FEMALE | 000BU | 225-552 |
| | ----- | | - | | (OPT 1 ONLY) | | |
| -9 | 366-0497-00 | | 4 | | KNOB: GY, 0.127 ID X 0.706 OD | 80009 | 366-0497-00 |
| | ----- | | - | | EACH KNOB INCLUDES: | | |
| | 213-0153-00 | | 1 | | .SETSCREW: 5-40 X 0.125, STL BK OXD, HEX | 000CY | OBD |
| -10 | ----- | | 1 | | RESISTOR, VAR: (SEE R81 EPL) | | |
| | | | | | ***** (ATTACHING PARTS) ***** | | |
| -11 | 210-0583-00 | | 1 | | NUT, PLAIN, HEX: 0.25-32 X 0.312 INCH, BRS | 73743 | 2X20317-402 |
| -12 | 210-0940-00 | | 1 | | WASHER, FLAT: 0.25 ID X 0.375 INCH OD, STL | 79807 | OBD |
| -13 | 210-0046-00 | | 1 | | WASHER, LOCK: 0.261 ID, INTL, 0.018 THK, BRS | 78189 | 1214-05-00-0541C |
| | | | | | ***** (END ATTACHING PARTS) ***** | | |
| -14 | ----- | | 1 | | RESISTOR, VAR: (SEE R96 EPL) | | |
| | | | | | ***** (ATTACHING PARTS) ***** | | |
| -15 | 210-0583-00 | | 1 | | NUT, PLAIN, HEX: 0.25-32 X 0.312 INCH, BRS | 73743 | 2X20317-402 |
| -16 | 210-0940-00 | | 1 | | WASHER, FLAT: 0.25 ID X 0.375 INCH OD, STL | 79807 | OBD |
| -17 | 210-0046-00 | | 1 | | WASHER, LOCK: 0.261 ID, INTL, 0.018 THK, BRS | 78189 | 1214-05-00-0541C |
| | | | | | ***** (END ATTACHING PARTS) ***** | | |
| -18 | ----- | | 2 | | RESISTOR, VAR: (SEE R97, R98 EPL) | | |
| | | | | | ***** (ATTACHING PARTS) ***** | | |
| -19 | 210-0583-00 | | 1 | | NUT, PLAIN, HEX: 0.25-32 X 0.312 INCH, BRS | 73743 | 2X20317-402 |
| -20 | 210-0940-00 | | 1 | | WASHER, FLAT: 0.25 ID X 0.375 INCH OD, STL | 79807 | OBD |
| -21 | 210-0046-00 | | 1 | | WASHER, LOCK: 0.261 ID, INTL, 0.018 THK, BRS | 78189 | 1214-05-00-0541C |
| | | | | | ***** (END ATTACHING PARTS) ***** | | |
| -22 | 333-2292-00 | | 1 | | PANEL, FRONT: 143 | 80009 | 333-2292-00 |
| -23 | 366-1729-00 | | 2 | | .KNOB: GRAY, LATCH | 80009 | 366-1729-00 |
| | ----- | | - | | (RACKMOUNT ONLY) | | |
| -24 | 367-0110-00 | | 2 | | HANDLE, CARRYING: 0.375 OD X 3.0 L X 1.75" H | 80009 | 367-0110-00 |
| | ----- | | - | | (RACKMOUNT ONLY) | | |
| | | | | | ***** (ATTACHING PARTS) ***** | | |
| -25 | 212-0574-00 | | 2 | | SCREW, MACHINE: 10-32 X 0.438" 100 DEG FLH S | 83385 | OBD |
| | ----- | | - | | (RACKMOUNT ONLY) | | |
| | | | | | ***** (END ATTACHING PARTS) ***** | | |
| -26 | 124-0341-00 | | 2 | | STRIP, TRIM: HANDLE BRACKET, BLANK | 80009 | 124-0341-00 |
| | ----- | | - | | (RACKMOUNT ONLY) | | |
| -27 | 214-2558-00 | | 2 | | SPRING, FLAT: CHASSIS TRACK LOCK | 80009 | 214-2558-00 |
| | ----- | | - | | (RACKMOUNT ONLY) | | |
| | | | | | ***** (ATTACHING PARTS) ***** | | |
| -28 | 212-0004-00 | | 2 | | SCREW, MACHINE: 8-32 X 0.312 INCH, PNH STL | 83385 | OBD |
| | ----- | | - | | (RACKMOUNT ONLY) | | |
| -29 | 210-1266-00 | | 1 | | WASHER, FLAT: 0.193 ID X 0.475 OD X 0.007 | 86928 | 5702-79-75 |
| | ----- | | - | | (RACKMOUNT ONLY) | | |
| | | | | | ***** (END ATTACHING PARTS) ***** | | |
| -30 | 407-0960-04 | | 2 | | BRACKET, ANGLE: RIGHT & LEFT, ALUMINUM | 80009 | 407-0960-04 |
| | ----- | | - | | (RACKMOUNT ONLY) | | |
| | | | | | ***** (ATTACHING PARTS) ***** | | |
| -31 | 212-0070-00 | | 2 | | SCREW, MACHINE: 8-32 X 0.312" 100 DEG, FLH ST | 83385 | OBD |
| | ----- | | - | | ***** (END ATTACHING PARTS) ***** | | |
| -32 | 426-0763-04 | | 2 | | FRAME SECT, CAB.: CORNER | 80009 | 426-0763-04 |
| | ----- | | - | | ***** (ATTACHING PARTS) ***** | | |
| -33 | 212-0043-00 | | 4 | | SCREW, MACHINE: 8-32 X 0.500 INCH, FLH STL | 83385 | OBD |
| | ----- | | - | | ***** (END ATTACHING PARTS) ***** | | |
| -34 | ----- | | 1 | | LAMP, LED: (SEE DS98 EPL) | | |
| -35 | ----- | | 1 | | SWITCH, LEVER: (SEE S81 EPL) | | |
| | | | | | ***** (ATTACHING PARTS) ***** | | |
| -36 | 220-0413-00 | | 2 | | NUT, SLEEVE: 4-40 X 0.562 INCH LONG | 80009 | 220-0413-00 |
| | | | | | ***** (END ATTACHING PARTS) ***** | | |

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| Fig. & Index No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Qty | 1 2 3 4 5 | Name & Description | Mfr Code | Mfr Part Number |
|------------------------|-----------------------|--------------------------------|-----|-----------|---|-------------|-----------------|
| 1-37 | --- | | 5 | | SWITCH, LEVER: SP3T (SEE S83, S87, S90, S94, S95 ***** (ATTACHING PARTS) ***** | | |
| -38 | 220-0413-00 | | 2 | | NUT, SLEEVE: 4-40 X 0.562 INCH LONG ***** (END ATTACHING PARTS) ***** | 80009 | 220-0413-00 |
| -39 | --- | | 10 | | SWITCH, LEVER: (SEE S80, S82, S84, S86, S88, S91, S96, S97 EPL) ***** (ATTACHING PARTS) ***** | | |
| -40 | 220-0413-00 | | 2 | | NUT, SLEEVE: 4-40 X 0.562 INCH LONG ***** (END ATTACHING PARTS) ***** | 80009 | 220-0413-00 |
| -41 | --- | | 1 | | SWITCH, LEVER: DP3T (SEE S93A, S93B EPL) ***** (ATTACHING PARTS) ***** | | |
| -42 | 220-0413-00 | | 2 | | NUT, SLEEVE: 4-40 X 0.562 INCH LONG ***** (END ATTACHING PARTS) ***** | 80009 | 220-0413-00 |
| -43 | 210-0255-00 | | 6 | | TERMINAL, LUG: 0.391 ID, LOCKING, BRS CD PL | 80009 | 210-0255-00 |
| -44 | --- | | 2 | | LAMP, LED: (SEE DS96, DS97 EPL) | | |
| -45 | 386-3710-00 | | 1 | | SUBPANEL, FRONT: 143 | 80009 | 386-3710-00 |
| | 386-3709-00 | | 1 | | SUBPANEL, FRONT: 143 OPT 01 ***** (ATTACHING PARTS) ***** | 80009 | 386-3709-00 |
| -46 | 210-0457-00 | | 3 | | NUT, PL, ASSEM WA: 6-32 X 0.312, STL CD PL ***** (END ATTACHING PARTS) ***** | 83385 | OBD |
| -47 | 351-0104-03 | | 2 | | SLIDE SECT, DWR: 12.625 L, W/O HARDWARE (RACKMOUNT ONLY) ***** (ATTACHING PARTS) ***** | 06666 | C-720-3 |
| -48 | 212-0004-00 | | 1 | | SCREW, MACHINE: 8-32 X 0.312 INCH, PNH STL (RACKMOUNT ONLY) ***** (END ATTACHING PARTS) ***** | 83385 | OBD |
| -49 | --- | | 3 | | TRANSISTOR: (SEE Q80, Q97, Q99 EPL) ***** (ATTACHING PARTS) ***** | | |
| -50 | 210-0406-00 | | 1 | | NUT, PLAIN, HEX: 4-40 X 0.188 INCH, BRS | 73743 | 12161-50 |
| -51 | 210-1122-00 | | 1 | | WASHER, LOCK: 0.12 ID, DISHED, 0.025 THK ***** (END ATTACHING PARTS) ***** | 86928 | OBD |
| -52 | 342-0163-00 | | 3 | | INSULATOR, PLATE: XSTR, 0.675 X 0.625 X 0.001 | 80009 | 342-0163-00 |
| -53 | 426-1390-00 | | 1 | | FRAME SECT, CAB.: RIGHT ***** (ATTACHING PARTS) ***** | 80009 | 426-1390-00 |
| -54 | 212-0043-00 | | 3 | | SCREW, MACHINE: 8-32 X 0.500 INCH, FLH STL | 83385 | OBD |
| -55 | 211-0538-00 | | 4 | | SCREW, MACHINE: 6-32 X 0.312" 100 DEG, FLH ST ***** (END ATTACHING PARTS) ***** | 83385 | OBD |
| -56 | 426-1389-00 | | 1 | | FRAME SECT, CAB.: LEFT ***** (ATTACHING PARTS) ***** | 80009 | 426-1389-00 |
| -57 | 211-0538-00 | | 4 | | SCREW, MACHINE: 6-32 X 0.312" 100 DEG, FLH ST | 83385 | OBD |
| -58 | 212-0043-00 | | 3 | | SCREW, MACHINE: 8-32 X 0.500 INCH, FLH STL ***** (END ATTACHING PARTS) ***** | 83385 | OBD |
| -59 | 426-0763-04 | | 2 | | FRAME SECT, CAB.: CORNER ***** (ATTACHING PARTS) ***** | 80009 | 426-0763-04 |
| -60 | 212-0043-00 | | 2 | | SCREW, MACHINE: 8-32 X 0.500 INCH, FLH STL ***** (END ATTACHING PARTS) ***** | 83385 | OBD |





| Fig. & Index No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Qty | 1 2 3 4 5 | Name & Description | Mfr Code | Mfr Part Number |
|------------------------|-----------------------|--------------------------------|-----|-----------|--|-------------|-----------------|
| 2- | 672-0679-00 | | 1 | | CKT CARD ASSY:(ATTACHING PARTS)..... | 80009 | 672-0679-00 |
| -1 | 211-0008-00 | | 4 | | SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL(END ATTACHING PARTS)..... | 83385 | OBD |
| | 119-0877-00 | | 1 | | .OVEN ASSEMBLY: .CKT BOARD ASSY INCLUDES:(ATTACHING PARTS)..... | 80009 | 119-0877-00 |
| -2 | 210-0586-00 | | 2 | | ..NUT,PL,ASSEM WA:4-40 X 0.25,STL | 83385 | OBD |
| -3 | 210-0054-00 | | 2 | | ..WASHER,LOCK:SPLIT,0.118 ID X 0.212"OD S(END ATTACHING PARTS)..... | 83385 | OBD |
| -4 | 200-1840-00 | | 1 | | ..COVER,OVEN: | 80009 | 200-1840-00 |
| -5 | 342-0284-00 | | 1 | | ..INSUL,OVEN,THRM: | 80009 | 342-0284-00 |
| -6 | 342-0283-00 | | 1 | | ..INSUL,OVEN,THRM: | 80009 | 342-0283-00 |
| -7 | | | 1 | | ..CKT BOARD ASSY:OVEN(SEE A3 EPL) | | |
| -8 | 131-0590-00 | | 5 | | ...CONTACT,ELEC:0.71 INCH LONG | 22526 | 47351 |
| -9 | 342-0285-00 | | 1 | | ...INSULATOR,OVEN:ELECTRICAL,SILICONE RUBB | 80009 | 342-0285-00 |
| -10 | 344-0281-00 | | 1 | | ...CLIP,SPRING:OVEN,CU BE | 80009 | 344-0281-00 |
| -11 | | | 1 | | ..CKT BOARD ASSY:REF. OSC.(SEE A2 EPL) | | |
| -12 | 131-0589-00 | | 19 | | ..TERMINAL,PIN:0.46 L X 0.025 SQ | 22526 | 48283-029 |
| -13 | 136-0220-00 | | 14 | | ..SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB | 71785 | 133-23-11-034 |
| -14 | 214-0579-00 | | 9 | | ..TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| -15 | 136-0263-04 | | 5 | | ..SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PI | 22526 | 75377-001 |
| -16 | 136-0514-00 | | 2 | | ..SKT,PL-IN ELEK:MICROCIRCUIT,8 DIP | 73803 | CS9002-8 |
| -17 | 136-0269-02 | | 6 | | ..SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,LOW C | 73803 | CS9002-14 |
| -18 | 136-0260-02 | B010100 B020428 | 5 | | ..SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW C | 71785 | 133-51-92-008 |
| -19 | | | 1 | | CKT BOARD ASSY:MODULATOR(SEE A8 EPL)(ATTACHING PARTS)..... | | |
| -20 | 211-0008-00 | | 5 | | SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL(END ATTACHING PARTS)..... | 83385 | OBD |
| | | | - | | .CKT BOARD ASSY INCLUDES: | | |
| -21 | 214-0579-00 | | 7 | | .TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| -22 | 136-0237-00 | | 2 | | .SOCKET,PLUG-IN:8 CONTACT,ROUND | 71785 | 133-98-12-062 |
| -23 | 136-0220-00 | | 27 | | .SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M | 71785 | 133-23-11-034 |
| -24 | 136-0514-00 | | 3 | | .SKT,PL-IN ELEK:MICROCIRCUIT,8 DIP | 73803 | CS9002-8 |
| -25 | 136-0269-02 | | 4 | | .SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,LOW CL | 73803 | CS9002-14 |
| -26 | 136-0260-02 | B010100 B020428 | 6 | | .SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL | 71785 | 133-51-92-008 |
| -27 | 131-0589-00 | | 14 | | .TERMINAL,PIN:0.46 L X 0.025 SQ | 22526 | 48283-029 |
| -28 | 136-0241-00 | | 1 | | .SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M | 71785 | 133-99-12-064 |
| -29 | 136-0219-00 | | 1 | | .SOCKET,PLUG-IN:4 PIN | 80009 | 136-0219-00 |
| -30 | | | 1 | | CKT BOARD ASSY:SYNC AND TIMING(SEE A4 EPL)(ATTACHING PARTS)..... | | |
| -31 | 211-0008-00 | | 6 | | SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL(END ATTACHING PARTS)..... | 83385 | OBD |
| | | | - | | .CKT BOARD ASSY INCLUDES: | | |
| -32 | 136-0241-00 | B010100 B020428 | 1 | | .SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M | 71785 | 133-99-12-064 |
| -33 | 131-0589-00 | | 43 | | .TERMINAL,PIN:0.46 L X 0.025 SQ | 22526 | 48283-029 |
| -34 | 136-0237-00 | | 2 | | .SOCKET,PLUG-IN:8 CONTACT,ROUND | 71785 | 133-98-12-062 |
| -35 | 131-0608-00 | | 3 | | .TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD | 22526 | 47357 |
| -36 | 131-0993-00 | | 1 | | .BUS,CONDUCTOR:2 WIRE BLACK | 00779 | 850100-01 |
| -37 | 346-0130-00 | B010100 B010148 | 1 | | .STRAP,RETAINING:FOR 40 CONTACT SBSTR SKT | 00779 | 350894-1 |
| -38 | 136-0641-00 | B010100 B010147 | 1 | | .SOCKET,PLUG-IN:40 CONTACT | 00779 | 1-485169-2 |
| | 136-0623-00 | B010148 | 1 | | .SOCKET,PLUG-IN:40 DIP,LOW PROFILE | 73803 | CS9002-40 |
| -39 | 136-0514-00 | | 5 | | .SKT,PL-IN ELEK:MICROCIRCUIT,8 DIP | 73803 | CS9002-8 |
| -40 | 136-0269-00 | | 19 | | .SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE | 73803 | CS9002-14 |
| -41 | 136-0260-00 | B010100 B020428 | 15 | | .SOCKET,PLUG-IN:16 CONTACT,RECT SHAPE | 71785 | 133-51-92-008 |
| | 136-0260-02 | B020429 | 14 | | .SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL | 71785 | 133-51-92-008 |
| -42 | 214-0579-00 | | 6 | | .TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| -43 | 136-0220-00 | B010100 B019999 | 33 | | .SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M | 71785 | 133-23-11-034 |
| | 136-0220-00 | B020000 | 29 | | .SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M | 71785 | 133-23-11-034 |
| -44 | 337-1417-00 | | 2 | | .SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH | 80009 | 337-1417-00 |
| -45 | | | 1 | | CKT BOARD ASSY:VIDEO OUTPUT(SEE A9 EPL)(ATTACHING PARTS)..... | | |
| -46 | 211-0008-00 | | 6 | | SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL(END ATTACHING PARTS)..... | 83385 | OBD |

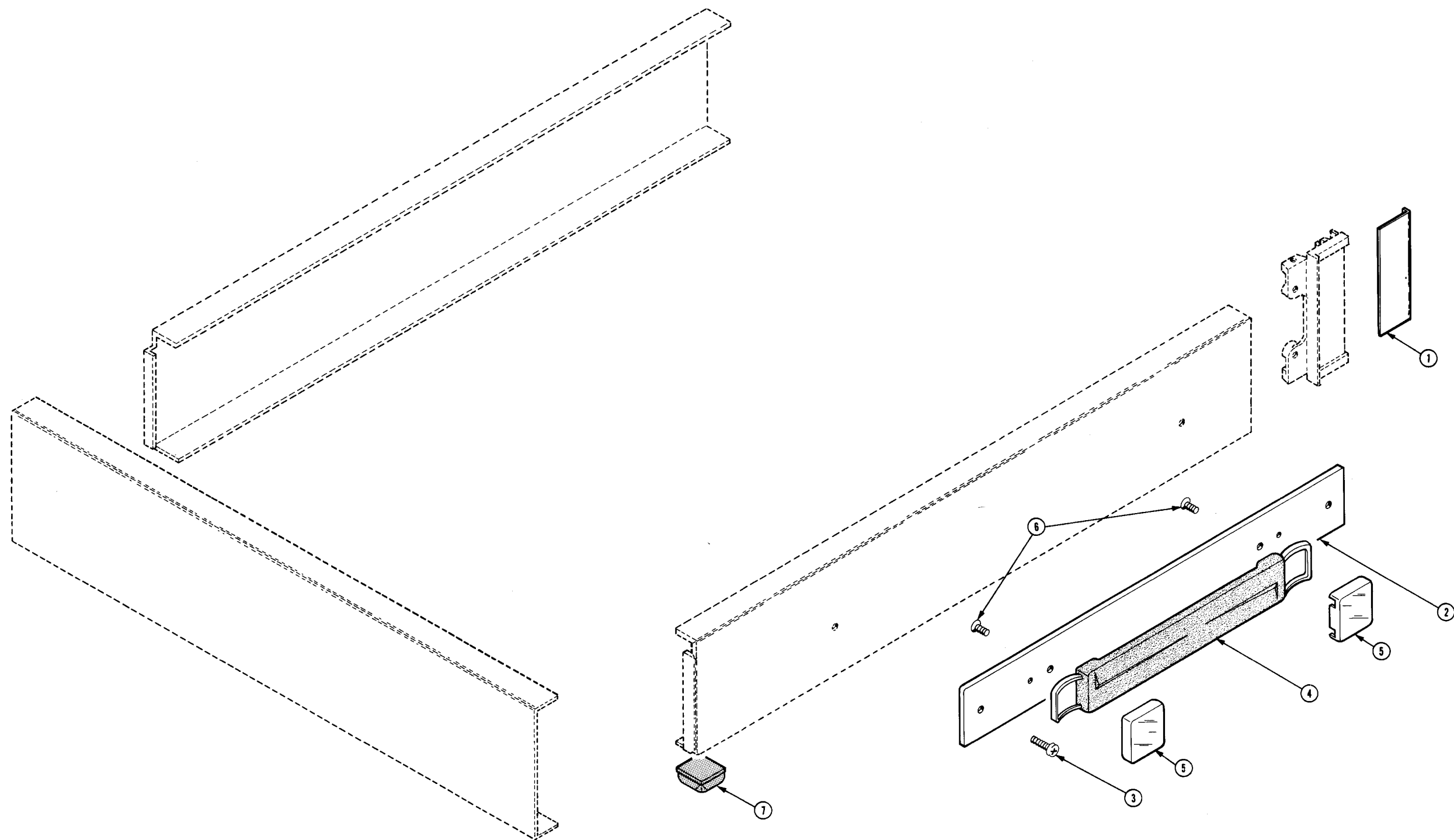
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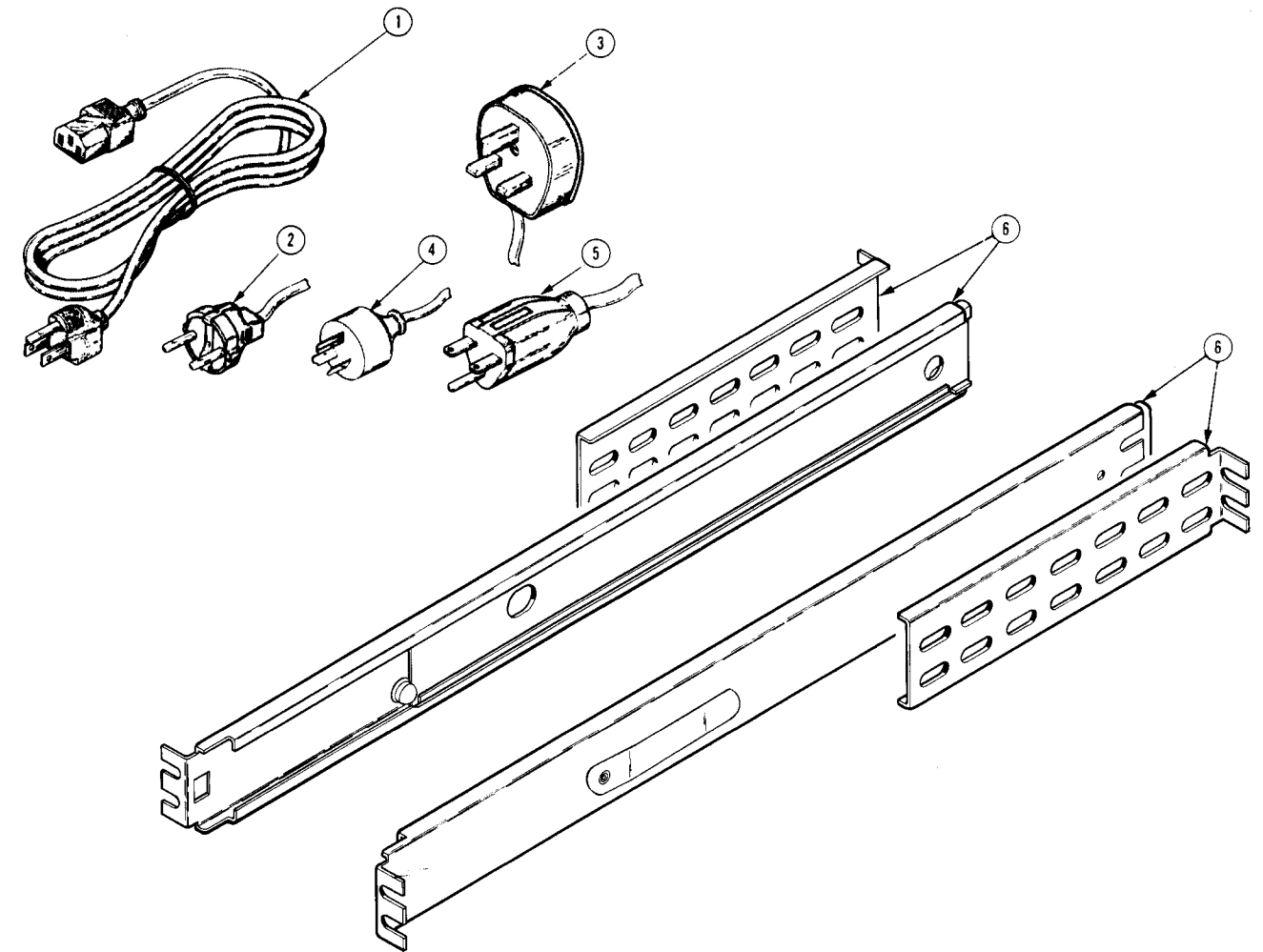
| Fig. & Index No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Qty | 1 2 3 4 5 | Name & Description | Mfr Code | Mfr Part Number |
|------------------------|-----------------------|--------------------------------|-----|-----------|--|-------------|------------------|
| 2- | ---- | | - | | .CKT BOARD ASSY INCLUDES: | | |
| -47 | 337-1417-00 | | 2 | | .SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH | 80009 | 337-1417-00 |
| -48 | 136-0220-00 | | 17 | | .SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M | 71785 | 133-23-11-034 |
| -49 | 136-0183-00 | B010100 | 2 | | .SOCKET,PLUG-IN:3 PIN,ROUND | 80009 | 136-0183-00 |
| -50 | 214-1291-00 | B010100 | 2 | | .HEAT SINK,ELEC:XSTR,0.72 OD X 0.375"H | 05820 | 207SB |
| | 214-3136-00 | B020430 | 2 | | .HEAT SINK,XSTR: | 13103 | 2228B |
| -51 | 131-0589-00 | | 18 | | .TERMINAL,PIN:0.46 L X 0.025 SQ | 22526 | 48283-029 |
| -52 | 131-0608-00 | | 20 | | .TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD | 22526 | 47357 |
| -53 | 131-0993-00 | | 6 | | .BUS,CONDUCTOR:2 WIRE BLACK | 00779 | 850100-01 |
| -54 | 136-0241-00 | B010100 | | | ...SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB | 71785 | 133-99-12-064 |
| | 136-0241-00 | B020429 | 2 | | .SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M | 71785 | 133-99-12-064 |
| -55 | 136-0269-02 | | 1 | | .SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,LOW CL | 73803 | CS9002-14 |
| -56 | 214-0579-00 | | 4 | | .TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| -57 | 255-0334-00 | | IN | | PLASTIC CHANNEL:12.75 X 0.175 X 0.155,NYL | 11897 | 122-37-2500 |
| -58 | 210-0202-00 | | 9 | | TERMINAL,LUG:0.146 ID,LOCKING,BRZ TINNED ***** (ATTACHING PARTS) ***** | 78189 | 2104-06-00-2520N |
| -59 | 213-0044-00 | | 1 | | SCR,TPG,THD FOR:5-32 X 0.188 INCH,PNH STL ***** (END ATTACHING PARTS) ***** | 83385 | OBD |
| -60 | ---- | | 1 | | CKT BOARD ASSY:CROSSHATCH(SEE A6 EPL) ***** (ATTACHING PARTS) ***** | | |
| -61 | 211-0008-00 | | 4 | | SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL ***** (END ATTACHING PARTS) ***** | 83385 | OBD |
| | ---- | | - | | .CKT BOARD ASSY INCLUDES: | | |
| -62 | 214-0579-00 | | 7 | | .TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| -63 | 136-0220-00 | | 9 | | .SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M | 71785 | 133-23-11-034 |
| -64 | 136-0183-00 | B010100 | 1 | | .SOCKET,PLUG-IN:3 PIN,ROUND | 80009 | 136-0183-00 |
| -65 | 131-0589-00 | B020391 | 21 | | .TERMINAL,PIN:0.46 L X 0.025 SQ | 22526 | 48283-029 |
| -66 | 131-0608-00 | | 3 | | .TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD | 22526 | 47357 |
| -67 | 131-0993-00 | | 1 | | .BUS,CONDUCTOR:2 WIRE BLACK | 00779 | 850100-01 |
| -68 | 136-0269-02 | | 5 | | .SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,LOW CL | 73803 | CS9002-14 |
| -69 | 136-0260-02 | | 5 | | .SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL | 71785 | 133-51-92-008 |
| -70 | ---- | | 1 | | CKT BOARD ASSY:COLOR BAR LOGIC(SEE A7 EPL) ***** (ATTACHING PARTS) ***** | | |
| -71 | 211-0008-00 | | 6 | | SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL ***** (END ATTACHING PARTS) ***** | 83385 | OBD |
| | ---- | | - | | .CKT BOARD ASSY INCLUDES: | | |
| -72 | 131-0608-00 | | 6 | | .TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD | 22526 | 47357 |
| -73 | 131-0993-00 | | 2 | | .BUS,CONDUCTOR:2 WIRE BLACK | 00779 | 850100-01 |
| -74 | 136-0260-02 | B010100 | 8 | | .SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL | 71785 | 133-51-92-008 |
| | 136-0260-02 | B020429 | 7 | | .SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL | 71785 | 133-51-92-008 |
| -75 | 131-0589-00 | | 29 | | .TERMINAL,PIN:0.46 L X 0.025 SQ | 22526 | 48283-029 |
| -76 | 136-0220-00 | | 29 | | .SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M | 71785 | 133-23-11-034 |
| -77 | 136-0269-02 | | 4 | | .SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,LOW CL | 73803 | CS9002-14 |
| -78 | 136-0514-00 | | 3 | | .SKT,PL-IN ELEK:MICROCIRCUIT,8 DIP | 73803 | CS9002-8 |
| -79 | 214-1291-00 | B010100 | 2 | | .HEAT SINK,ELEC:XSTR,0.72 OD X 0.375"H | 05820 | 207SB |
| | 214-3136-00 | B020430 | 2 | | .HEAT SINK,XSTR: | 13103 | 2228B |
| -80 | 136-0183-00 | B010100 | 1 | | .SOCKET,PLUG-IN:3 PIN,ROUND | 80009 | 136-0183-00 |
| -81 | 214-0579-00 | | 4 | | .TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| -82 | 136-0241-00 | B010100 | 1 | | .SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB M | 71785 | 133-99-12-064 |
| -83 | ---- | | 1 | | CKT BOARD ASSY:PULSE OUTPUT(SEE A5 EPL) ***** (ATTACHING PARTS) ***** | | |
| -84 | 211-0008-00 | | 6 | | SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL ***** (END ATTACHING PARTS) ***** | 83385 | OBD |
| | ---- | | - | | .CKT BOARD ASSY INCLUDES: | | |
| -85 | 131-0993-00 | | 11 | | .BUS,CONDUCTOR:2 WIRE BLACK | 00779 | 850100-01 |
| -86 | 131-0589-00 | | 3 | | .TERMINAL,PIN:0.46 L X 0.025 SQ | 22526 | 48283-029 |
| -87 | 131-0608-00 | | 34 | | .TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD | 22526 | 47357 |
| -88 | 136-0260-02 | | 5 | | .SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CL | 71785 | 133-51-92-008 |
| -89 | 214-0579-00 | | 13 | | .TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| -90 | 337-1417-00 | | 2 | | .SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH | 80009 | 337-1417-00 |
| -91 | 136-0183-00 | B010100 | 3 | | .SOCKET,PLUG-IN:3 PIN,ROUND | 80009 | 136-0183-00 |
| -92 | 136-0514-00 | | 1 | | .SKT,PL-IN ELEK:MICROCIRCUIT,8 DIP | 73803 | CS9002-8 |
| -93 | 136-0220-00 | | 23 | | .SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M | 71785 | 133-23-11-034 |
| -94 | 136-0269-02 | | 2 | | .SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,LOW CL | 73803 | CS9002-14 |
| -95 | ---- | | 1 | | CKT BOARD ASSY:POWER SUPPLY(SEE A1 EPL) ***** (ATTACHING PARTS) ***** | | |
| -96 | 211-0008-00 | | 8 | | SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL ***** (END ATTACHING PARTS) ***** | 83385 | OBD |

| Fig. & Index No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Qty | 1 2 3 4 5 | Name & Description | Mfr Code | Mfr Part Number |
|------------------------|-----------------------|--------------------------------|-----|-----------|--|-------------|-----------------|
| 2- | ----- | | - | | .CKT BOARD ASSY INCLUDES: | | |
| -97 | 131-0589-00 | | 52 | | .TERMINAL,PIN:0.46 L X 0.025 SQ | 22526 | 48283-029 |
| -98 | 344-0286-00 | | 8 | | .CLIP,ELECTRICAL:FOR 3AG FUSE,BRS | 75915 | 102074 |
| -99 | 214-0579-00 | | 4 | | .TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| -100 | 346-0128-00 | | 2 | | .STRAP,TIE DOWN:0.1W X 8.0" LONG,NYLON | 06383 | PLT2M |
| -101 | 136-0220-00 | | 9 | | .SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M | 71785 | 133-23-11-034 |
| -102 | 214-1291-00 | B010100 | 3 | | .HEAT SINK,ELEC:XSTR,0.72 OD X 0.375"H | 05820 | 207SB |
| | 214-3136-00 | B020430 | 3 | | .HEAT SINK,XSTR: | 13103 | 2228B |
| -103 | 136-0183-00 | B010100 | 3 | | .SOCKET,PLUG-IN:3 PIN,ROUND | 80009 | 136-0183-00 |
| -104 | 441-1371-00 | | 1 | | CHASSIS,GEN:MAIN | 80009 | 441-1371-00 |
| | | | | | ***** (ATTACHING PARTS) ***** | | |
| -105 | 211-0510-00 | | 3 | | SCREW,MACHINE:6-32 X 0.375.PNH,STL,CD PL | 83385 | OBD |
| | | | | | ***** (END ATTACHING PARTS) ***** | | |
| -106 | 200-2122-00 | | 3 | | PLUG,HOLE:0.375 OD,NYLON | 28520 | 0P-375 |
| | 131-2001-00 | | 13 | | CONN,RCPT,ELEC:MINIQUICK,FEMALE | 000BU | 225-552 |
| | ----- | | - | | (OPTION 1 ONLY) | | |
| -107 | 131-0955-00 | | 13 | | CONN,RCPT,ELEC:BNC,FEMALE | 13511 | 31-279 |
| -108 | 210-0255-00 | | 13 | | TERMINAL,LUG:0.391 ID,LOCKING,BRS CD PL | 80009 | 210-0255-00 |
| -109 | 334-2553-00 | | 1 | | MARKER,IDENT:MARKED CAUTION | 80009 | 334-2553-00 |
| -110 | 200-1788-00 | | 1 | | COV,PROT,LINE:1.20 X 1.20 X 0.842",PLSTC | 80009 | 200-1788-00 |
| -111 | ----- | | 1 | | FILTER,RADINTE:(SEE FL98 EPL) | | |
| | | | | | ***** (ATTACHING PARTS) ***** | | |
| -112 | 210-0586-00 | | 2 | | NUT,PL,ASSEM WA:4-40 X 0.25,STL | 83385 | OBD |
| -113 | 211-0012-00 | | 2 | | SCREW,MACHINE:4-40 X 0.375.PNH STL CD PL | 83385 | OBD |
| | | | | | ***** (END ATTACHING PARTS) ***** | | |
| -114 | 200-0237-03 | B010100 | 1 | | COVER,FUSE HLDR: | 80009 | 200-0237-03 |
| | 200-0237-04 | B010197 | 1 | | COVER,FUSE HLDR:PLASTIC,SAFETY CONTROLLED | 80009 | 200-0237-04 |
| -115 | 213-0176-00 | | 1 | | SCR,TPG,THD FOR:2-32 X 0.156 INCH.PNH,STL | 83385 | OBD |
| -116 | 352-0362-00 | | 1 | | FUSEHOLDER: W/MOUNTING HARDWARE | 75915 | 345001 |
| -117 | 200-0772-04 | | 1 | | COVER,XFMR:TV GRAY | 80009 | 200-0772-04 |
| | | | | | ***** (ATTACHING PARTS) ***** | | |
| -118 | 220-0410-00 | | 4 | | NUT,EXTENDED WA:10-32 X 0.375 INCH,STL | 83385 | OBD |
| -119 | 212-0517-00 | | 4 | | SCREW,MACHINE:10-32 X 1.750 INCH,HEX HD S | 83385 | OBD |
| | | | | | ***** (END ATTACHING PARTS) ***** | | |
| -120 | 166-0226-00 | | 4 | | INS SLV,ELEC:1.125 INCHES LONG | 80009 | 166-0226-00 |
| -121 | ----- | | 1 | | TRANSFORMER:(SEE T98 EPL) | | |
| -122 | 333-2293-00 | | 1 | | PANEL,REAR: | 80009 | 333-2293-00 |
| | 333-2294-00 | | 1 | | PANEL,REAR:143 OPT 01 | 80009 | 333-2294-00 |
| -123 | 179-2562-00 | B010100 | 1 | | WIRING HARNESS:MAIN | 80009 | 179-2562-00 |
| | 179-2562-01 | B010310 | 1 | | WIRING HARNESS:MAIN | 80009 | 179-2562-01 |
| -124 | 131-0621-00 | | 154 | | .CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD | 22526 | 46231 |
| | 131-0622-00 | | 27 | | .CONTACT,ELEC:0.577"L,28-32 AWG WIRE | 22526 | 46241 |
| | 131-0792-00 | | 27 | | .CONNECTOR,TERM:18-20 AWG,CU BE GOLD PL | 22526 | 46221 |
| | 131-1119-00 | | 6 | | .CONTACT,ELEC:FOR NO. 22-26 AWG WIRE | 22526 | 75374-001 |
| -125 | 352-0169-00 | | 3 | | .HLDR,TERM CONN:2 WIRE BLACK | 80009 | 352-0169-00 |
| -126 | 352-0197-00 | | 3 | | .CONN BODY,PL,EL:1 WIRE BLACK | 80009 | 352-0197-00 |
| -127 | 352-0198-00 | | 9 | | .HLDR,TERM CONN:2 WIRE BLACK | 80009 | 352-0198-00 |
| -128 | 352-0199-00 | | 5 | | .CONN BODY,PL,EL:3 WIRE BLACK | 80009 | 352-0199-00 |
| -129 | 352-0200-00 | | 15 | | .HLDR,TERM CONN:4 WIRE BLACK | 80009 | 352-0200-00 |
| -130 | 352-0201-00 | | 2 | | .CONN BODY,PL,EL:5 WIRE BLACK | 80009 | 352-0201-00 |
| -131 | 352-0202-00 | | 2 | | .HLDR,TERM CONN:6 WIRE BLACK | 80009 | 352-0202-00 |
| -132 | 352-0203-00 | | 2 | | .HLDR,TERM CONN:7 WIRE BLACK | 80009 | 352-0203-00 |
| -133 | 352-0204-00 | | 4 | | .CONN BODY,PL,EL:8 WIRE BLACK | 80009 | 352-0204-00 |
| -134 | 352-0205-00 | | 3 | | .CONN BODY,PL,EL:9 WIRE BLACK | 80009 | 352-0205-00 |
| -135 | 352-0206-00 | | 3 | | .HLDR,TERM CONN:10 WIRE BLACK | 80009 | 352-0206-00 |
| | 179-2563-00 | | 1 | | WIRING HARNESS:TRANSFORMER | 80009 | 179-2563-00 |
| | 131-0621-00 | | 7 | | .CONNECTOR,TERM:22-26 AWG,BRS & CU BE GOLD | 22526 | 46231 |
| | 352-0203-00 | | 1 | | .HLDR,TERM CONN:7 WIRE BLACK | 80009 | 352-0203-00 |
| | 198-3611-00 | | 1 | | WIRE SET,ELEC: | 80009 | 198-3611-00 |
| -136 | 131-1790-00 | | 9 | | .CONTACT,ELEC:18-24 AWG,FEMALE,BRASS | 27264 | 08-56-0105 |
| -137 | 204-0671-00 | | 9 | | .CONN BODY,PLUG:1 X 3 CONTACTS NYLON | 27264 | 09-50-7031 |
| -138 | 175-1148-00 | | FT | | .CABLE,SP,ELEC:4,22 AWG STRD,GRAY VINYL JK | 80009 | 175-1148-00 |

Replaceable Mechanical Parts—143

| Fig. & Index No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Qty | 1 2 3 4 5 | Name & Description | Mfr Code | Mfr Part Number |
|------------------------|-----------------------|--------------------------------|-----|-----------|--|-------------|-----------------|
| 3-1 | 124-0252-01 | | 4 | | STRIP,TRIM:CORNER | 80009 | 124-0252-01 |
| -2 | 386-1663-03 | | 1 | | PLATE,HANDLE:W/CLIPS ***** (ATTACHING PARTS) ***** | 80009 | 386-1663-03 |
| -3 | 212-0068-00 | | 2 | | .SCREW,MACHINE:8-32 X 0.312 INCH,TRH STL ***** (END ATTACHING PARTS) ***** | 77250 | OBD |
| -4 | 367-0037-00 | | 1 | | .HANDLE,CARRYING: | 80009 | 367-0037-00 |
| -5 | 344-0098-00 | | 2 | | .CLIP,DECORATIVE:CARRYING HANDLE,STL NP ***** (ATTACHING PARTS) ***** | 80009 | 344-0098-00 |
| -6 | 212-0506-00 | | 2 | | .SCREW,MACHINE:10-32 X 0.375 INCH,FLH STL ***** (END ATTACHING PARTS) ***** | 83385 | OBD |
| -7 | 348-0502-00 | | 4 | | .FOOT,CABINET:0.812 SQ X 0.3 HIGH | 04963 | SJ-5023GRAY |





| Fig. & Index No. | Tektronix Part No. | Serial/Model No. Eff Dscont | Qty | 1 | 2 | 3 | 4 | 5 | Name & Description | Mfr Code | Mfr Part Number |
|------------------------|-----------------------|-------------------------------------|-----|---|---|---|---|---|--|-------------|-----------------|
| 4-1 | 161-0066-00 | | 1 | | | | | | CABLE ASSY,PWR:,3,18 AWG,115V,98.0 L | 16428 | KH8481 |
| -2 | 161-0066-09 | B020429 | 1 | | | | | | CABLE ASSY,PWR:3,0.75MM SQ,220V,96.0 L (A1 EUROPEAN ONLY) | 80126 | OBD |
| -3 | 161-0066-10 | B020429 | 1 | | | | | | CABLE ASSY,PWR:3,0.75MM SQ,240V,96.0 L (A2 UNITED KINGDOM ONLY) | 80126 | OBD |
| -4 | 161-0066-11 | B020429 | 1 | | | | | | CABLE ASSY,PWR:3,0.75MM,240V,96.0L (A3 AUSTRALIAN ONLY) | S3109 | OBD |
| -5 | 161-0066-12 | B020429 | 1 | | | | | | CABLE ASSY,PWR:3,18 AWG,240V,96.0 L (A4 NORTH AMERICAN ONLY) | 70903 | OBD |
| -6 | 351-0487-02 | | PR | | | | | | SLIDE,DWR,EXT:W/CLOSED MOUNTING SLOTS | 80009 | 351-0487-02 |
| | 070-2204-00 | | 1 | | | | | | MANUAL,TECH: | 80009 | 070-2204-00 |

MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Since the change information sheets are carried in the manual until all changes are permanently entered, some duplication may occur. If no such change pages appear following this page, your manual is correct as printed.



Tektronix

COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

Group Code 20

Date: 11-4-85

Change Reference: C100/281

Product: General

Manual Part No: General

DESCRIPTION

WARNING

During rackmount installation, interchanging the left and right slide-out track assemblies defeats the extension stop (safety latch) feature of the tracks. Equipment could, when extend, come out of the slides and fall from the rack, possible causing personal injury and equipment damage.

When mounting the supplied slide-out tracks, inspect both assemblies to find the LH (left hand) and RH (right hand) designations to determine correct placement. Install the LH assembly to your left side as you face the front of the rack and install the RH assembly to your right side. Refer to the rackmounting instructions in this manual for complete information.

